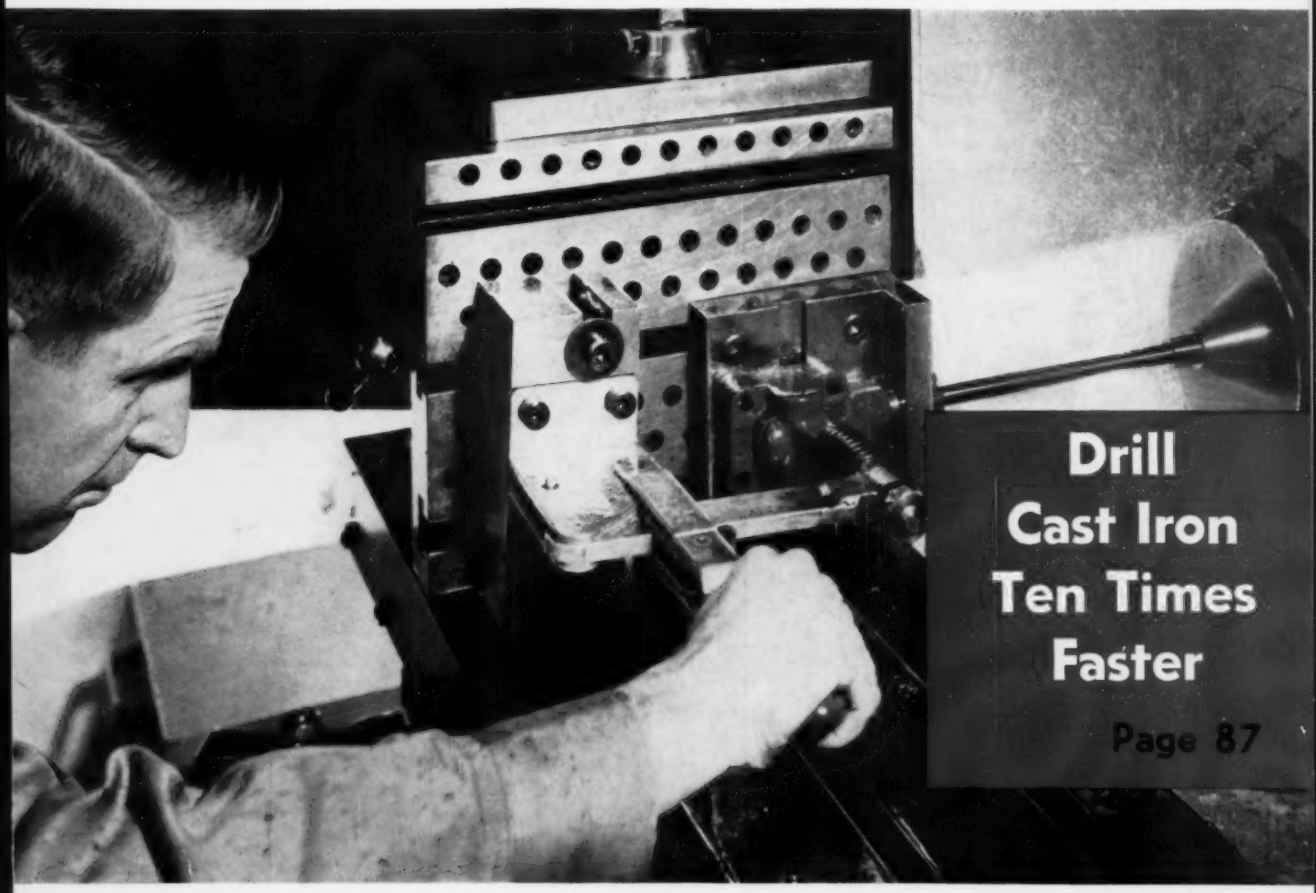
February 9, 1956

The IRON AGE

The National Metalworking Weekly



Drill Cast Iron Ten Times Faster

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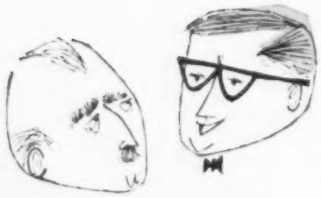
How new extras affect your steel bill 47
New moly steels for critical gears 92
Are we losing our nerve? 7

Digest of the Week—Page 2

These days WISE MEN are talking savings

IN ELECTRIC FURNACES

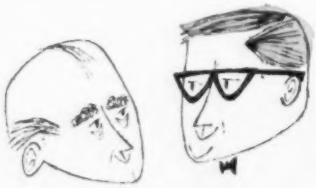


"The Whiting Hydro-Arc Furnace has real cost-saving advantages."

"Uni-directional electrode motors . . . no reversing."

"Arc regulation to a fixed standard."

"Electrode motors driven directly from arc-furnace bus without extra machinery."



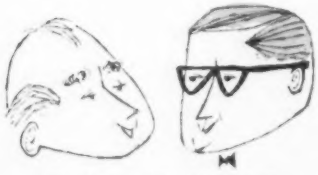
"Regulated watt-input or heat-input to furnace. More efficient utilization of power input."

"Installation costs are lower—all these factors lead to better control and lowest cost per ton of melt."

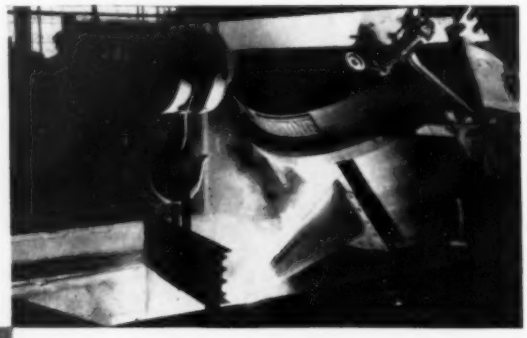
"Only a few years ago, such electrode speed, acceleration and response were considered impossible."

"The least number of moving parts."

"Electrode consumption and refractory costs are lower."



"Let's send for the Whiting Arc Furnace Bulletin FY-168 . . . it gives all the facts!"



WHITING
HYDRO-ARC

WHITING CORPORATION
15601 Lathrop Avenue, Harvey, Illinois

Voices under the sea

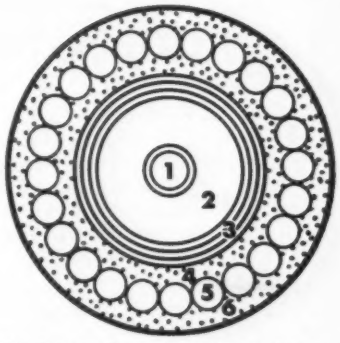
Late last summer *HMTS Monarch*, British cable ship, completed the ticklish job of laying the first of twin telephone cables some 2,250 miles across the Atlantic, from Newfoundland to Scotland. When the second cable is laid during the coming summer, it will mark the establishment of the first trans-Atlantic telephone system.

This joint venture of American, British and Canadian interests will make it possible for your voice to travel to Europe as clearly as in a telephone chat with a neighbor. The new cables will carry up to 36 conversations at the same time. Service is to be inaugurated by late 1956.

Major strength element of the new cables is a spiral wrapping of 24 steel armor wires, for which Simplex Wire and Cable Company, cable manufacturers, used a quantity of bethanized wire. Developed by Bethlehem, bethanized wire is electrolytically coated with pure zinc. The coating is uniform, highly ductile, and tightly bonded to the steel wire.

A number of underwater cables have been armored with bethanized wire. And that's just one of hundreds of uses for this unique wire. Capable of being severely formed, bethanized wire is available with light, medium, and heavy coatings which provide excellent corrosion-resistance.

We suggest you let us arrange a trial order. Our nearest sales office will gladly give you full details.



This drawing shows the structural features of the 1¼-in. diam type D cable used in deep water. 1—Copper center wire and surround tapes. 2—Polyethylene insulation. 3—Copper return tapes, teredo tape and telconax tape. 4—Jute bedding. 5—24 steel armor wires. 6—Two servings of jute. Heavier types of cable construction are used in shallow water.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM WIRE

BETHLEHEM STEEL

DIGEST OF THE WEEK IN METALWORKING

February 9, 1956—Vol. 177, No. 6

The IRON AGE

Digest Of The Week In Metalworking

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NEWS DEVELOPMENTS

HOW NEW EXTRAS AFFECT YOUR STEEL BILL P. 47

New steel extras increase prices of hot-rolled sheets and strip about $3 a ton. Plate extra revisions average about $5 higher. Overall changes since last July average $1.30.

STEEL EARNINGS HIT RECORD HEIGHTS P. 48

Steel companies earned about 70 pct more last year than in 1954; some 50 pct more than in 1953. Earnings were 41 pct more than old record year, 1950.

HOW MUCH IS RESEARCH COSTING INDUSTRY? P. 49

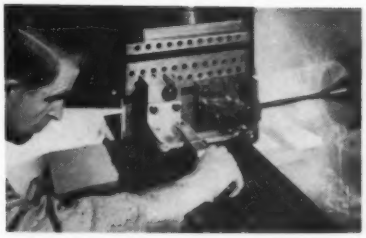
New figures show research costing industry about $5 billion a year. This is 1.1 pct of national output, and the trend is upward. Competition for engineers is fattening research budgets. Some companies are spending up to 10 pct of income on research.

FORD ENGINEER LOOKS AT RED AUTOMATION P. 53

N. L. Bean, one of three U. S. engineers to tour Russian industry in December, reports in interview his views and reactions to USSR progress in automation. Many of the plants have up-to-date automatic handling, use modern machining techniques. Space is at a premium in most plants, making factory areas cluttered.

CAN TREASURY FIND $3 BILLION SURPLUS? P. 61

If April tax returns result in surplus reaching $3 billion, small tax cuts are assured. But industry will get scant relief. Congress fights credit curbs, wants plenty of dollars in circulation at election time.



TYPICAL setup for boring a cast iron valve stem bushing, using a carbide-tipped drill which permits higher speed cutting. See story P. 87.

WHY DIAMOND TOOLS DRAW NEW INTEREST P. 75

Diamond symposium at March meeting of tool engineers will cover natural and synthetic stones. Special interest stems from development in diamond production. Users want to know if the synthetic product has reached full commercial status. They ask if added supply means new applications.

FEATURE ARTICLES

TOOL DRILLS CAST IRON 10 TIMES FASTER P. 87

A new carbide-tipped drill whizzes through cast iron, low carbon steel, bronze and aluminum at feeds up to 60 ipm. At 15 ipm, feed hole tolerance is within 0.0002 in., surface finish is a smooth 4 microinches. Hollow drill produces both chips and a solid core. Regrinding is simple.

WELD GIANT TUBES ON ASSEMBLY LINE P. 90

Fabricating the double-walled steel casing for an underwater vehicular tunnel is a king-sized job. Sections 300-ft long must be weld-assembled, then floated to the tunnel site. Baldwin-Lima-Hamilton Corp. makes a complete section in less than two weeks on a well planned assembly line. A giant fixture speeds the operation.

NEW CARBURIZING STEELS FOR CRITICAL GEARING P. 92

Top carburizing quality at lower cost is the major selling point of a new series of carburizing steels. Putting molybdenum to work as the chief alloying element, these steels can be quenched directly from carburizing temperatures without excessive retained austenite. They can provide a 63 Rc surface hardness at higher carbon levels. Yet they are easy to machine.

DO YOU REALLY NEED MORE STORAGE SPACE? P. 96

With warehouse space worth $5 to $10 per foot, aisle space is at best a necessary evil. Industrial trucks need room to maneuver and stack—but how much room? Space required by girth of trucks themselves has long been a major limiting factor. New, slim-silhouette trucks permit reductions up to 50 pct in aisle space without impairing efficiency.

CONTROL HEAT TO DROP TITANIUM FORMING COST P. 98

Titanium can now be fabricated in the shop almost as readily as sheet aluminum or stainless steel. Solution of springback problem brought about the break through. Variable springback has baffled even experienced foremen. Hot forming segregated lots is part of the answer.

MARKETS AND PRICES

WOULD A NEW SILVER LAW AVERT TROUBLE? P. 7

Current silver consumption exceeds production. But U. S. is taking large share. Proposed new law would ease this, but open the door to increased speculation and price fluctuations.

CADILLAC GROOMS ENTRY IN PRESTIGE FIELD P. 64

Cadillac's answer to the Continental Mark II is due for limited production in August. New Brougham model will put futuristic design features on the road, including stainless roof.

WEST REPORTS BRISK BUSINESS ACTIVITY P. 73

West Coast steelmaking rates are up over 100 pct of capacity. But consumers are calling for more steel, cutting production only when they can't get it. No sign of slump.

WHAT ABOUT THE STEEL PRICE OUTLOOK? P. 143

Uncertainty over steel prices is giving everybody the jitters. Indications are that prices will go up again soon—perhaps as much as $3 or $4 per ton. Steel producers need money for expansion and to offset effects of rising costs generally. Prices are expected to rise again after labor settlement.

TIN TALKS HAVE LONG RANGE IMPLICATIONS P. 150

Tenghu Abdul Rahman, head of the Malayan Federation, world's biggest tin producer, is in London asking for Malayan independence. He already has a diplomatic victory over the local Communists under his belt.

NEXT WEEK:

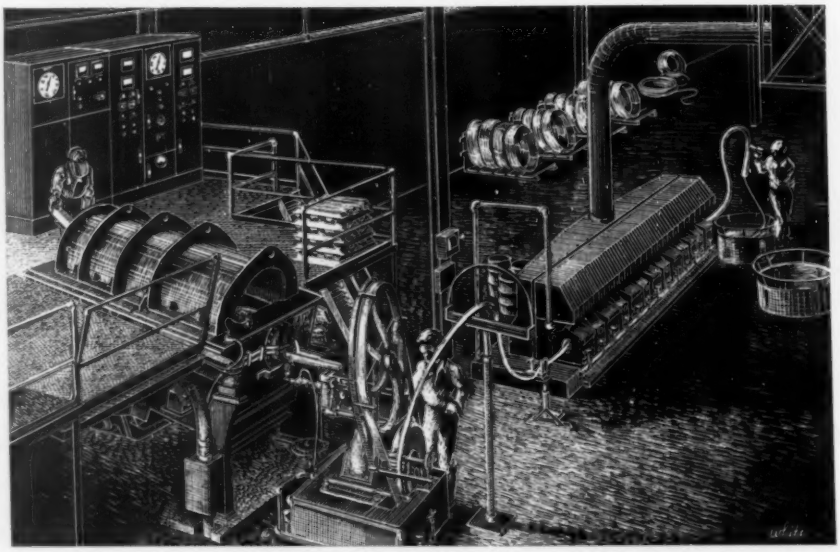
WHY PORTABLE TOOLS WILL BEAR WATCHING

Makers of pneumatic and electric tools are locked in a hot market battle. Sharp competition figures to benefit users. New design, new applications are part of current aggressive selling. Next week's story tells what's behind the market struggle; what's new in design and sales of power tools.

ABRASIVE WHEELS SIMPLIFY BILLET CUTTING

In billet form, some of the super-tough steel alloys aren't easy to cut into shorter lengths. Burning doesn't always give the required smooth-cut surface. Saw blades often find the going too slow for top production economy. One plant has adopted modern abrasive cut-off machines.

From Molten Aluminum to 3/8" Diameter Rod in 1½ Minutes!



Rome Cable Corporation

uses AJAX INDUCTION FURNACES **for**

MELTING ALUMINUM FOR CONTINUOUS CASTING AND ROLLING OF HIGH CONDUCTIVITY ROD

The picture above, a drawing made at the Rome Cable Corporation, Rome, N. Y., shows one of the most modern installations in the country for the continuous casting and rolling of aluminum rod directly from molten metal. From left to right are shown the electric controls of the adjacent 450 kW. AJAX low frequency induction combined melting and holding furnace which is pouring molten metal into the Properzi continuous casting machine in the foreground, and the rolling mill from which the coiled rod is emerging.

This installation casts at the rate of about one ton per hour. The furnace feeds a continuous stream of molten aluminum at automatically controlled temperature into a rim cavity on the slowly revolving wheel of the Properzi machine. Metal loss from pig to rod averages less than 1 pct. Mechanical properties and electrical conductivity are excellent; the material is sound and fine grained. The men work under cooler, cleaner conditions because the only heat generated is within the melt itself. Due to melting conditions inherent in AJAX furnaces, the operation is continuous and no fluxing is required.

AJAX TAMA-WYATT

AJAX ENGINEERING CORP., TRENTON 7, N. J.

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BPA NBP

EDITORIAL

Are We Losing Our Guts?

◆ HERE WE ARE in one of the biggest booms in our history. We never had it so good. We carry our kids around on a pillow. We spare ourselves things our fathers took without a thought.

We have the greatest future ahead of us that the world has ever seen. We may be able to abolish poverty. The stage is set for mechanical and electronical gadgets and machines that will further reduce our need to exert ourselves—or our brains.

Fortunately, competition and hard selling are still with us. We hope they are the essence of more good things to come. But do we act as if they were the life blood of our free enterprise? We surely don't. Sometimes we act like a bunch of neurotic patients who have been helped by the miracle drug but who lack confidence in its cure.

There was a time when all businessmen stood up on their hind legs and yelled for free enterprise—and practiced it. Now some of us yell for it—in speeches. If it involves us, we want free enterprise. But we want "him" bound hand and foot.

Recently some businessmen were begging Congressmen—either by direct testimony or by inference—to "take over." "Let's have a law for this" or a "law for that." "Let's bind the other fellow" so we can have life a little easier and not have to work or sell so hard; like autos for instance.

There have been pleas to regulate the natural gas producers. Who was pleading for control over companies which for years have kept householders satisfied with their gas bills? Certainly not those who want free competition and growth in gas output.

We have "expert" tinkering and tampering with our basic credit lines. We have had quiet moves to control scrap exports. We have other regulation demands. Do we want the control straitjacket back again?

We have the greatest opportunity in our history to use common sense, hard selling and free enterprise. So what do some of us do? Run to Washington for "help" from other mortals. They can't help us as well as we can help ourselves.

Have we lost our guts entirely?

Tom Campbell

EDITOR-IN-CHIEF

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dear editor: *letters from readers*

Military Reserve

Sir:

Congratulations on, "Are We Unfair to Our Military?"

It is a timely editorial.

And should the steel industry also not encourage its members to participate in Reservist activities —those men who follow a dual career? As citizens they must provide a living for themselves and their families. As reservists they voluntarily impose upon themselves the additional responsibilities of military preparedness. *Capt. R. C. Billbury, Director, Naval Reserve Officers School, Detroit, Mich.*

Light Metals

Sir:

On page 269 of the January 5 issue of THE IRON AGE there appeared an amusing cartoon in which a workman is airborne by a piece of light sheet metal.

"It's a new light weight metal they want us to try—that's all I know."

We are planning a presentation on magnesium tooling plate to our various distributors and have considered the possibility of using this cartoon on one side of a small card.

Please advise what steps are necessary to obtain permission to reproduce the cartoon for this use. *W. H. Gross, Magnesium Dept., The Dow Chemical Co., Midland, Mich.*

You have our permission providing the cartoon is not used for magazine advertising purposes.—Ed.

Vacuum Melting

Sir:

Please send me a copy of the vacuum melting bibliography to which you referred in the January 26, 1956, issue of your magazine.

The information contained therein should prove most helpful to our Panel on "Alloys for Use at Elevated Temperatures," and especially to our Sub-Panel on "Vacuum Melting and Production"—and will be very greatly appreciated. *J. R. Lane, Staff Metallurgist, National Research Council, National Academy of Sciences, Washington, D. C.*

Sir:

Kindly forward me two copies of your bibliography regarding vacuum melting as prepared by Mr. T. J. Kopkin.

Thank you in advance, our congratulations on your article of January 26. *K. C. Taylor, F. J. Stokes Machine Co., Philadelphia.*

Sir:

I would like to compliment you on your recent article "Why Is the Big Money Behind Vacuum Metals?" It was timely and helpful.

I would like to have a copy of the bibliography prepared by Mr. T. J. Kopkin and Mr. V. DePierre. *J. W. Wilton, Chief Metallurgist, The Wallingford Steel Co., Wallingford, Conn.*

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fatigue cracks

by William M. Coffey

Watch March 8

Keep a weather eye open for the special Tool Engineer issue coming March 8. It is one more in THE IRON AGE series that tells you how to get more for a dollar—this time the tooling dollar.

Tells how to get the most out of your metal cutting and forming tools, including: choosing the right equipment or when to use standard, semi-automatic or special equipment, tips on buying—delivery time, extras, service, range of performance.

. . . and it tells about automation: where automation can be applied and to what extent, pointers on parts handling and position, use of conveyors.

How To Save

In this series your ffj editors have distilled the best cost saving ideas from purchasing, production and engineering brains of both large and small metalworking plants.

How to shave a buck on tooling is being spearheaded by Engineering Editor Walter G. Patton. We want to tell you just a little bit about Walter G. Patton. We will state categorically at this time, right here in this very column that Walter G. Patton is one of the top men in the country on this subject. Engineering reporting is a hard job. Good engineering reporters must combine engineering know-how with reportorial skill and a flair for writing—a rare combination, hard to find. Pat has all three in large doses, but what raises him far above the rest are his contacts. In his 10 years with THE IRON AGE he has made metalworking contacts all over the place, established scores of listening posts that he can tap at any time to stay on top of every new development in tooling and processing.

Whaaaat?

George Baker, our Washington editor, sent us something that looks like a hand-bill and reads like this:

> COMANCHE DIRT SITTING CENTER
>
> Why go to Comanche to put your feet in URANIUM dirt when you have Comanche dirt from Comanche right here in San Marcos?
>
> Available in a big motor coach for your convenience—nicely furnished, air-cooled, electrically heated, comfortable in every way.
>
> Come in and inspect. Reasonable rates. You are invited to refer to the article on page 16 of the December issue of *True Magazine*, entitled "The Underground Cure For Arthritis."
>
> Comanche Dirt Sitting Center
> San Marcos, Texas

We've read this thing a hundred times in the last few weeks and still can't figure it out. But it comes from George so we know it must have a point to it and will be most welcomed by our readers. But please let us in on it, too.

Puzzlers

Many thanks to Robert J. West of the Harnischfeger Corp. for this one about our favorite subject—money. A man with four $20 bills went to four different bank tellers and had each break one bill. His stipulation was that he wanted one coin for the first dollar, two for the second, three for the third and so on up to 20 coins for the twentieth dollar. He received the following number of coins:

TELLER	No. 1	No. 2	No. 3	No. 4
$1.00	1	1	1	1
.50	10	15	15	13
.25	24	27	28	20
.10	17	8	12	14
.05	118	59	44	112
.01	40	100	110	50

Which teller "goofed" on the instructions?

Recipes for RELIABILITY

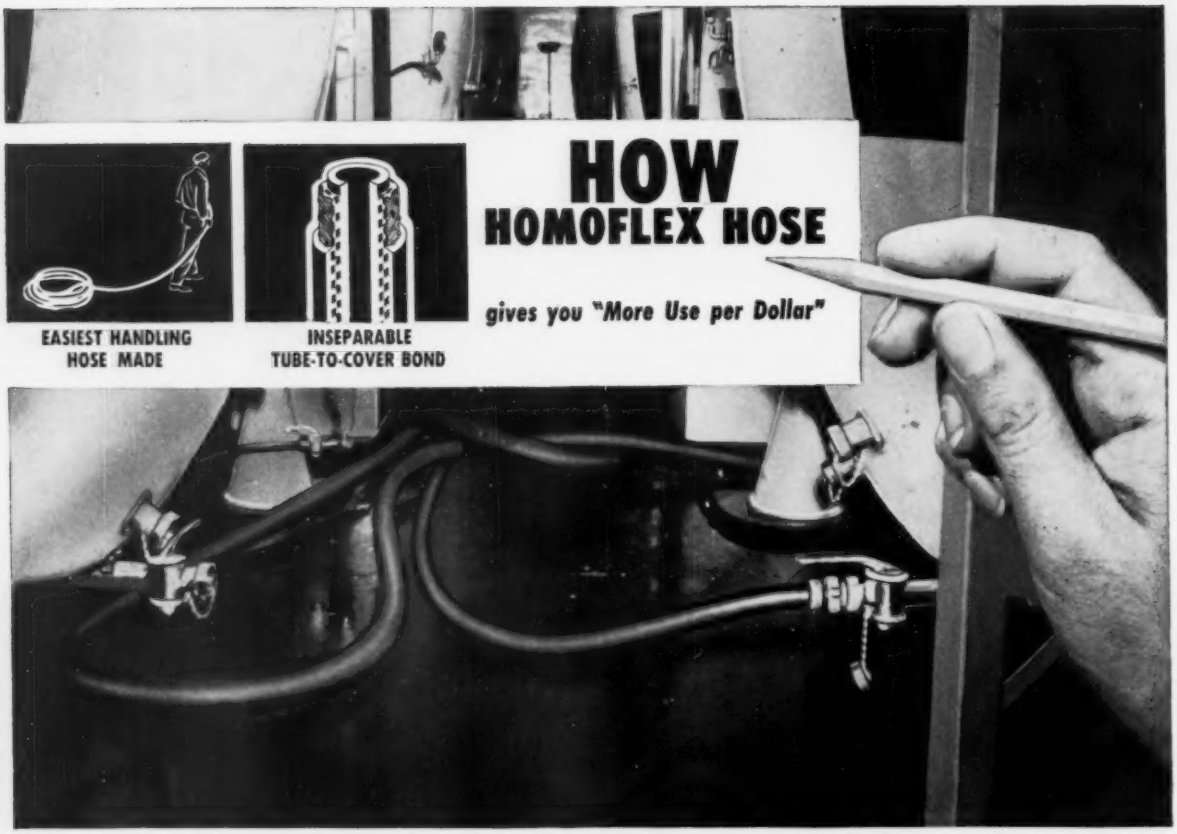
There's no guesswork in the production of Seymour nickel silver, phosphor bronze and brass. Every step in their manufacture is prescribed—in detail—in a master quality control manual which is "the law" throughout Seymour casting shops and mills.

This is another reason why Industry has come to rely on Seymour to deliver nonferrous metals which are uniform in quality, year in and year out.

"Specify Seymour! You know it's good!"

NICKEL SILVER
PHOSPHOR BRONZE
BRASS

THE SEYMOUR MFG. CO.
SEYMOUR, CONN., U. S. A.



EASIEST HANDLING HOSE MADE

INSEPARABLE TUBE-TO-COVER BOND

HOW HOMOFLEX HOSE

gives you "More Use per Dollar"

Many Users Say This Hose Outlasts Them All!

Bulk and stiffness have been engineered out of this modern hose. An exclusive R/M construction, Homoflex Hose has no pre-set twist . . . it coils and uncoils freely in any direction, eliminating strain at kinking points that can cause internal damage and eventual hose failure. Special engineering creates a homogeneous, inseparable tube-to-cover bond that greatly increases hose life . . . and reduces hose costs! Rugged and strong, flexible as a rope, and light, Homoflex Hose does a *better* job in handling air, water, and other fluids and gases . . . and it lasts longer.

Homoflex Hose maintains uniform inside and outside diameters for faster flow on the job . . . easier fitting of couplings. Ask your R/M representative about types of Homoflex Hose for your operations. He can also show you how other types of R/M Hose for general and special purposes last longer, too . . . give you "More Use per Dollar."

RM-611

R M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Flat Belts · V-Belts · Conveyor Belt · Hose · Roll Covering · Tank Lining · Abrasive Wheels

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

dates to remember

FEBRUARY

AMERICAN SOCIETY OF CIVIL ENGINEERS—National winter convention, Feb. 13-17, Dallas, Tex. Society headquarters, 39 W. 39th St. N. Y.

AMERICAN MANAGEMENT ASSN.—Mid-winter personnel conference, Feb. 15-17, The Palmer House, Chicago, Society headquarters, 1515 Broadway, New York.

THE DROP FORGING ASSN.—Industry meeting, Feb. 16-17, Park Sheraton Hotel, New York. Society headquarters, 734 Union Commerce Bldg., Cleveland.

EXPOSITIONS

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

ASSN. OF IRON & STEEL ENGINEERS, Sept. 25-28, Cleveland.

METAL SHOW—Oct. 8-12, Cleveland.

INSTITUTE OF SURPLUS DEALERS, INC.—11th annual trade show and convention, Feb. 19-21, 212th AAA Armory, N. Y. Society headquarters, 673 Broadway, N. Y.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS—Annual meeting, Feb. 19-23, Hotels Statler and New Yorker, N. Y. Society headquarters, 155 E. 44th St., N. Y.

ASSN. OF IRON & STEEL ENGINEERS—Annual West Coast meeting, Feb. 20-22, Hotel Statler, Los Angeles. Society headquarters, 1010 Empire Bldg., Pittsburgh.

MARCH

NATIONAL ASSN. OF CORROSION ENGINEERS—National conference and exhibition, March 12-16, Hotel Statler, N. Y. Society headquarters, 155 E. 44th St., N. Y.

PRESSED METAL INSTITUTE—Annual spring technical meeting, March 14-16, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

STEEL FOUNDERS' SOCIETY OF AMERICA—Annual meeting, March 19-20, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

AMERICAN HOT DIP GALVANIZERS ASSN., INC.—Annual meeting, March 22-23, Drake Hotel, Chicago. Society headquarters, 1806 First Nat. Bank Bldg., Pittsburgh.

AMERICAN MANAGEMENT ASSN.—Special manufacturing conference, March 26-28, Hotel Statler, Society headquarters, 1515 Broadway, N. Y.

look to ESCO for ALLOY AVAILABILITY

- HASTELLOY B & C
- ALLOY 20
- INCONEL
- MONEL
- PRECIPITATION HARDENING GRADES
- 0.03 MAX. CARBON

YOU GET FAST DELIVERY... even on small orders of special alloys...

Hastelloy B & C, Monel, Inconel, Alloy 20, 0.03 Max. Carbon, Precipitation Hardening Grades are just a few examples of alloys that are available—fast—when you need them. No waiting for long runs of standard production items to be completed before your order can be started. Big orders can be handled efficiently and economically too. A complete metallurgical laboratory enables *ESCO* to take advantage of the latest technological advances. Result: Outstanding quality control on every order.

UNUSUAL SHAPES AND SIZES ARE NO PROBLEM EITHER...

ESCO can supply you with static or centrifugal castings in wall sections and dimensions to meet your most exacting requirement. *ESCO* Shellcast is available, too, where needed.

Ask for details or write for free booklets... "How to cut Costs With *ESCO* Spuncast ®" ... and "*ESCO* Stainless and High Alloy Products for the Process Industries".

specialists in high alloy steels

ESCO HIGH ALLOY DIVISION

ELECTRIC STEEL FOUNDRY CO.

Manufacturing Plants
2184 N.W. 25th Ave., Portland 10, Oregon
712 Porter St., Danville, Illinois

ESCO International and New York Office
420 Lexington Ave., New York City, N.Y.

Other Offices and Warehouses
Los Angeles, San Francisco, Calif., Seattle, Spokane, Wash., Houston, Texas, Eugene, Ore., Salt Lake City, Utah, Honolulu, Hawaii, In Canada, Vancouver, British Columbia and Toronto, Ontario.

PRIME MOVER. Here a wire belt is conveying pottery from a baking kiln to the decorating department. Wire belts, woven from CF&I-Wickwire Wire, are used to convey everything from heavy metal parts to fluffy foam rubber during processing operations.

CF&I-WICKWIRE MAKES WIRE FOR THOUSANDS OF USES

SHELF HELP for the housewife. These dish-washer shelves are made of selected low carbon rods of CF&I-Wickwire Refrigerator Shelf Wire. Specifications call for an extra-clean, smooth, bright surface for plating.

from making dishes for the manufacturer to washing them for the housewife... nothing can take the place of wire!

Wire can answer an almost incredible variety of needs because it can be varied to provide thousands of different combinations of mechanical and physical properties. From wire that can be easily twisted by hand to a rigid, self-supporting wire, it can be "tailor-made" to meet almost any set of requirements.

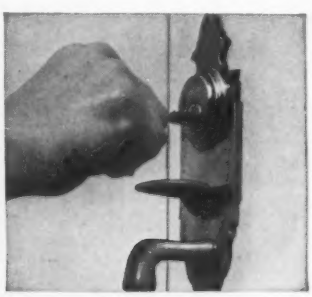
Whatever you assemble, manufacture, or process, let CF&I-Wickwire Wire help you do the job better, cheaper, and faster. You'll like doing business with CF&I-WICKWIRE and the careful attention given your own particular requirements.

CF&I-Wickwire Wire is made in plants conveniently located throughout the nation, from coast to coast. For detailed information, write our nearest district sales office.

WINDOW DRESSING. All kinds of draperies are hung on rods by means of strong, inexpensive drapery pins made from CF&I-Wickwire Drapery Pin Wire.

"RIBS" FOR HOSE. The rubber hose in grease guns is strengthened by basket-weave braided CF&I-Wickwire Hose Reinforcement Wire to help withstand high internal pressures. This wire is also used for rubber hoses in hydraulic brake lines and in hydraulic lines for aircraft.

FOR BACKYARD EXERCISE. These rake teeth are made of CF&I-Wickwire Rake Tine Steel Wire (flat scaleless tempered Spring Steel Wire).

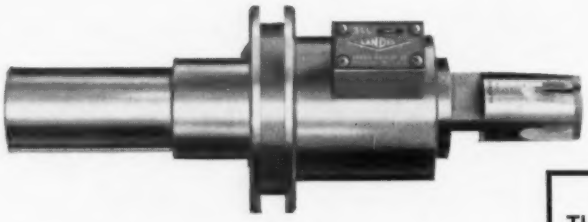


ALL SECURE. The spring used in this lockset is made from extra-tough CF&I-Wickwire Lock Spring Steel Wire to insure long, dependable life.

3144

CF&I—WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

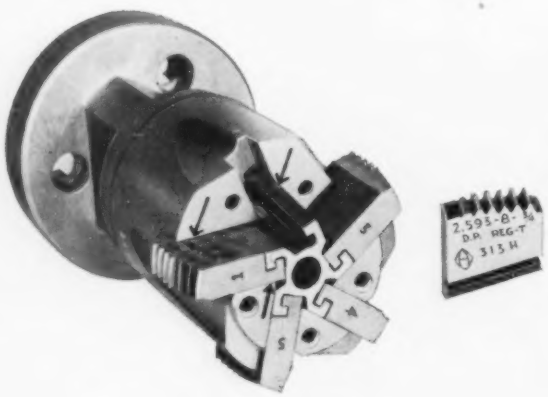


These THREADING TOOLS displayed at Booth 578 ASTE Show

LANDIS Taps for tapered threads

LL Collapsible Taps are available for producing internal tapered threads from 1-5/16" to 13-3/8" in diameter. The thread taper is produced by a mechanical receding action of the chasers during threading which reduces cutting strains by restricting cutting action to the chaser throat or chamfer section. As little or no "cold-working" can result, LL Taps are ideally suited for tapping tapered threads in stainless steel. These taps will also produce straight threads, and are available for either stationary or rotary applications.

Detachable heads are an important feature of all LANDIS Taps, and allow the tapping of a wide range of thread diameters with minimum tooling. For example, the 4 LL Tap body using 7 different Tap heads will tap all diameters from 2-7/8" to 7".



Maximum Rigidity

The basic design of all LANDIS Tap Heads assures maximum bearing support between the chaser, plunger and tap head body. In the cross-section illustration, note the heavy metal sections which provide rigidity to the chasers and plunger, particularly at the points where cutting strains are transmitted.

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT · CUTTING · TAPPING · GRINDING · ROLLING

LANDIS *Machine* COMPANY

WAYNESBORO · PENNSYLVANIA · U.S.A.

632

UNITED®
ALUMINUM FOIL MILL

DESIGNED AND BUILT BY — **UNITED**

ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

Plants at: Pittsburgh • Vandergrift • Youngstown • Canton
Wilmington (Lobdell United Division)

Subsidiaries: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Co., Inc., Aurora, Ind.

Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

Wagner®
ELECTRIC MOTORS
...the choice of leaders in industry

New NEMA Frames
Standard and Explosion-proof

Type EP
215 Frame

Wagner Totally-Enclosed Fan-Cooled Motors

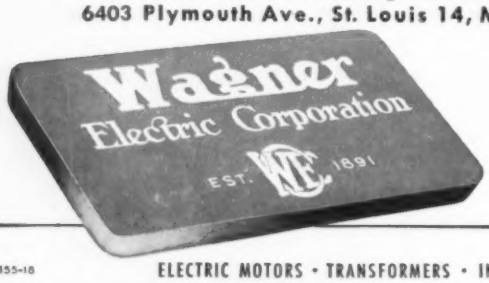
cut maintenance time and costs

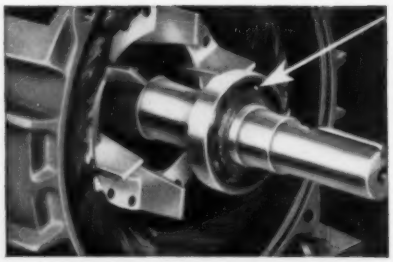
Check the features of the new *Wagner Type EP Totally Enclosed Motor*. They spell the difference between needless expenditures in maintenance time and costs . . . and a definite savings in motor upkeep and repairs. You'll find that for general industrial use where dust, dirt, filings, abrasives, steel chips or moisture are present, the Wagner Type EP Motor gives steady, troublefree performance and longer service life.

Wagner Type JP Explosion-Proof Motor . . . has the same quality construction as the Type EP — plus added features which make it completely safe to operate where explosive dust, gases or vapors are present.

Both Type EP and JP Wagner motors are available in ratings up to 250 horsepower. For complete information, just call the nearest of our 32 branch offices, or write for Bulletin MU-203.

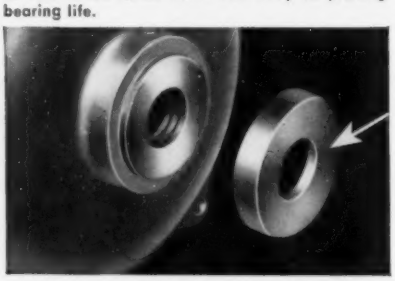
Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo.



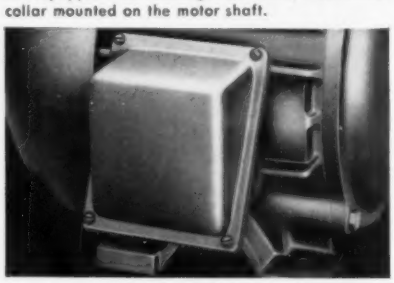


1 HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity provide long, troublefree service.

2 BEARINGS CAN BE RE-LUBRICATED—Wagner motors can be re-lubricated when necessary to prolong bearing life.



3 BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals, a machined collar mounted on the motor shaft.



4 EASY TO CONNECT—Large diagonally-split conduit box provides ample room for making connections. Leads are permanently identified.

5 NO GREASE LOSS—Bearing housings have effective seals to prevent escape of grease.

6 RIBBED FRAME—Ribs on the corrosion-resistant cast iron frames add mechanical strength and increase the surface area for more efficient cooling.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

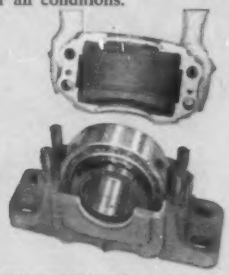
M55-18

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

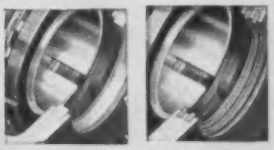
MORE FACTS on why more and more leading manufacturers choose Link-Belt bearings

Constant, heavy loads as produced by this high-capacity belt conveyor call for life-long alignment as built into Link-Belt roller bearing blocks.

SELF-ALIGNING ROLLER BEARING is self-contained and adjusted at the factory, needs no shims or alignment rings at installation. Design assures free rolling under all conditions.



TWO-PIECE HOUSING facilitates installation, inspection and disassembly. Both base and cap are machined as a unit for perfect match. The cap is doweled to the base for proper positioning.



CHOICE OF SEALS. Left, contact-type felt seals for grease lubrication and dirty conditions—right, spiral labyrinth steel seals for oil or grease lubrication and heat conditions.

Husky bearings in husky housings

--the choice for industry's big loads and toughest applications

BRING on your sudden loads and impacts, shaft deflection and misalignment. A heavy-duty, high-capacity Link-Belt self-aligning roller bearing takes such punishment in stride . . . adjusts immediately in all directions . . . delivers a high load at relatively moderate cost.

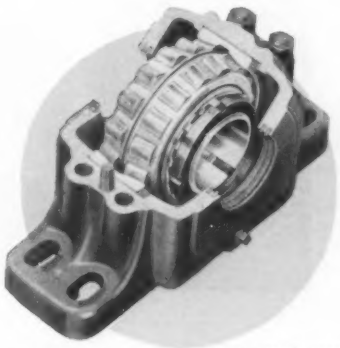
This simple, economical, easy-to-install "package" incorporates the popular Link-Belt self-aligning roller bearing in a durable cast iron housing with provision for lubrication. It's completely sealed to prevent entrance of dirt or loss of lubricant. The self-aligning roller bearings have internationally standardized boundary dimensions and are available everywhere.

For all your bearing needs, look to industry's most complete line of ball and roller bearing blocks. At any of 40 Link-Belt offices, you can get a copy of data Book 2550. Or ask your authorized stock-carrying distributor.

13,991

LINK-BELT

Ball and Roller Bearings



Series 6800, 6900, 7800, 7900 roller bearing blocks

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

The Gulf Super-Quench in the bath above has been in use for 2½ years at Cummins' Columbus, Indiana plant with only normal makeup oil being added. Cummins is the world's leading independent manufacturer of lightweight, high-speed Diesel engines. Left—Gulf Sales Engineer G. C. Shimer and G. R. Dellinger, Supervisor, Heat Treating Dept., check the rocker lever parts for Cummins Diesels as they emerge from the Super-Quench.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

GULF

Why Cummins Engine Company, Inc. has used GULF SUPER-QUENCH for 15 years!

Deeper, more uniform hardness without cracking or distortion and the virtual elimination of rejects in quenching Diesel engine parts are the reasons behind Cummins' use of Gulf Super-Quench for the past 15 years.

Another factor is the ability of this outstanding quenching oil to retain its fast dual quenching power indefinitely with only normal make-up. There is no need for additive replenishment.

For additional information on the economy of using Gulf Super-Quench, send the coupon below or have a Gulf Sales Engineer help you discover opportunities to use this quality product—profitably — in your shop. Consult the yellow pages of the telephone directory for the number of your local Gulf office.

Gulf Oil Corporation
Gulf Refining Company

1822 GULF BUILDING
PITTSBURGH 30, PA.

Gulf Oil Corporation · Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.

Gentlemen: IA

Please send me, without obligation, a copy of your 24-page brochure dealing with the application and advantages of Gulf Super-Quench.

Name _____

Title _____

Company _____

Address _____

Automation in Stamping Production Illustrated on the U. S. MULTI-SLIDE®

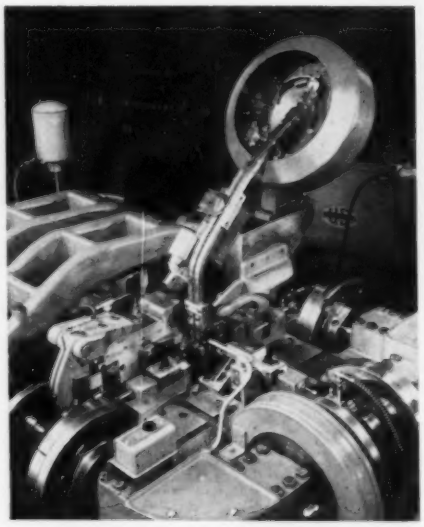
One of the aims of Automation should be the elimination, wherever possible, of secondary operations and handlings. You, like all manufacturers, are interested in attaining this result. The U. S. Multi-Slide can be the answer in the production of stampings.

The sequence-of-operations strip pictured above shows how a complete assembly is produced on the U. S. Multi-Slide without secondary operations. The finished assembly is an automotive fastener comprised of a sheet metal stamping and a nut. The stamping is produced on the U. S. Multi-Slide and the prefabricated nut is hopper-fed into proper position for automatic assembly. The complete unit is produced at the rate of 100 per minute – without handling.

The elimination of secondary operations results in reduced cost per piece, an all-important factor in today's competitive market. If you produce stampings and are interested in low piece part costs, why not investigate the use of U. S. Multi-Slide Machines?

Ask for Bulletin 15-C giving complete specifications

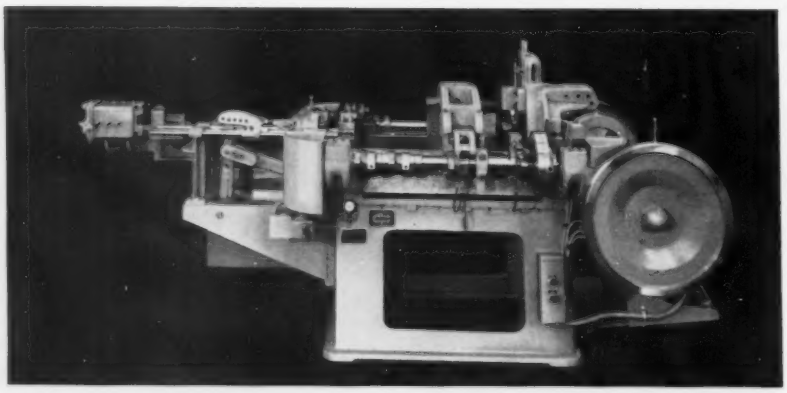
Below: Hopper feed unit mounted on U. S. Multi-Slide Machine for hoppering the nuts into position for assembly.



U. S. TOOL COMPANY, Inc.

AMPERE (East Orange)
NEW JERSEY

Builders of U. S. Multi-Slides
U. S. Multi-Millers
U. S. Automatic Press Room Equipment
U. S. Die Sets and Accessories



Left: Standard No. 33 U. S. Multi-Slide Machine on which the hopper feed unit is installed.

Want prolonged paint adherence?

Weirzin

ELECTROLYTIC ZINC-COATED SHEET

How to paint, enamel, lacquer or lithograph metal parts is often a perplexing problem. Poor adherence means dissatisfied customers.

Weirzin has a simple solution, proved highly satisfactory, in a tight malleable zinc coating that is *actually part of the steel*. The coat remains intact even under extreme temperature and humidity. What's more, neither punching nor forming nor deep drawing can rupture the even deposit. Thus underfilm corrosion cannot form and, as a result, paint does not crack, chip or flake.

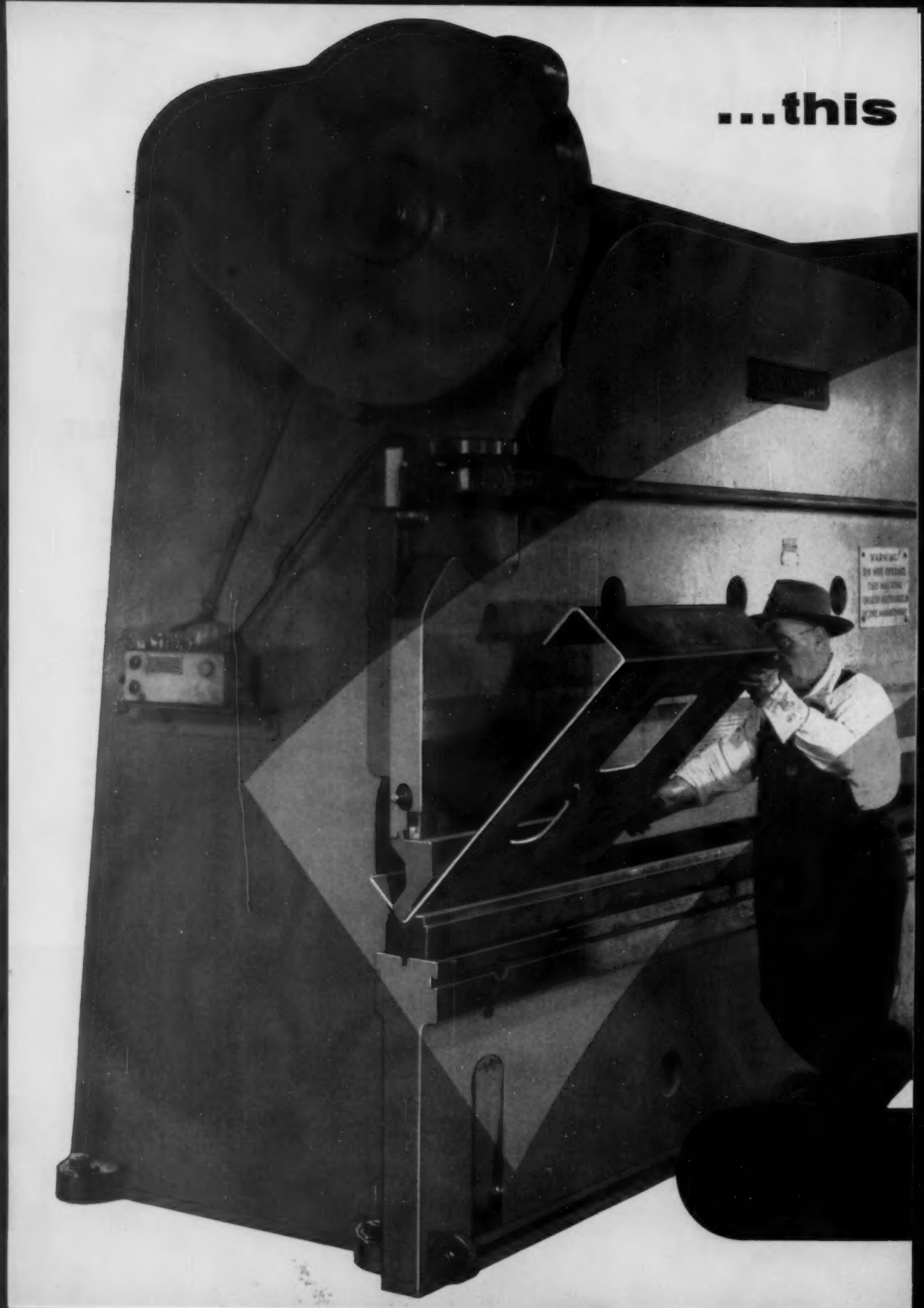
This electrolytic zinc-coated steel—with or without chemical treatment—is available in coils, in cut lengths, in all regular widths and gauges. Find out how easily leading manufacturers satisfy their customers with this exceptional product. Phone or write now.

WEIRTON STEEL COMPANY

Weirton, West Virginia

NATIONAL STEEL CORPORATION

WEIRTON STEEL COMPANY


...this

modern CINCINNATI PRESS BRAKE...

gets the orders

at MARION MACHINE, FOUNDRY & SUPPLY CO.
Marion, Indiana

This Cincinnati Press Brake immediately produced orders in a highly competitive jobbing market.

A $25,000 job, which previously would have been lost, was profitably handled. A 3" channel with 2¾" flanges was formed in six gauge material.

Investigate these modern design features for low cost production.

- Centerline loading.
- Rigid, All-Steel Construction
- Deep beds and rams
- Interlocked construction
- Large, high strength radii—free of weld
- Ram elevation—complete with micrometer indicators
- Tilting ram adjustment

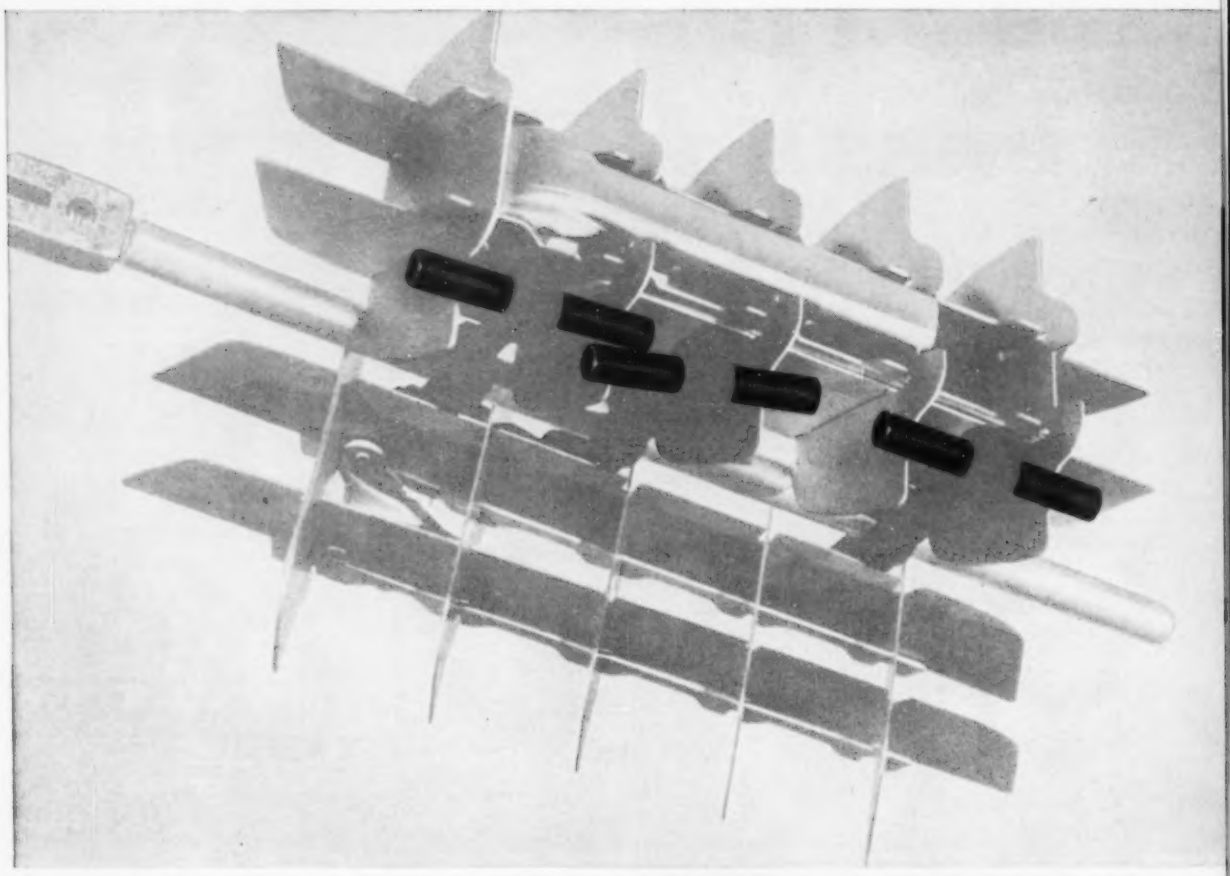
Write for Cincinnati Press Brake Catalog B-4.

Photos courtesy the Marion Machine, Foundry & Supply Company, Marion, Indiana.

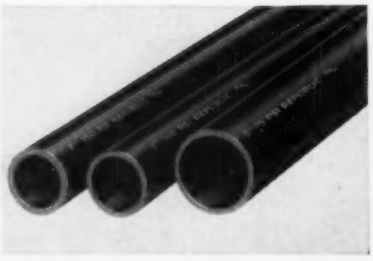
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

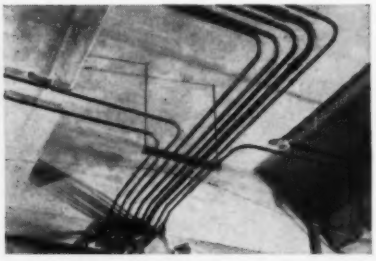
CINCINNATI



CORROSIVE HEADACHES RELIEVED IN ASPIRIN PLANT with Republic ENDURO Stainless Steel. Because the chemicals, salycilic acid and acetic anhydride used in making aspirin powder attack ordinary metals, ENDURO Stainless Steel is used here for all equipment coming in contact with the powder during processing. If your equipment must resist corrosion and protect product quality and color, then specify Republic ENDURO Stainless Steel.



PERIODIC AND COSTLY PIPE REPLACEMENTS REDUCED with Republic's new plastic pipe — Semi-Rigid Kralastic. Extremely tough, it will absorb punishment without breaking or shattering and is highly resistant to most corrosive liquids and gases. Kralastic is ideally suited for both waste and process lines in the food processing and chemical industries. It is non-toxic. It's easy to handle, easy to join. Available in a wide range of working pressures.



DOUBLE PROTECTION FOR ELECTRICAL RACEWAYS in extremely corrosive atmospheres is provided by the tough, polyethylene coating over the galvanized finish of Republic Dekoron-Coated Electrical Metallic Tubing. Installation is simple. Moisture-tight joints are easily made, using threadless connectors and couplings. Joints are sealed with tape. Republic Dekoron-Coated E.M.T. reduces replacement costs. Cuts down-time of costly equipment. It costs less because it lasts longer.

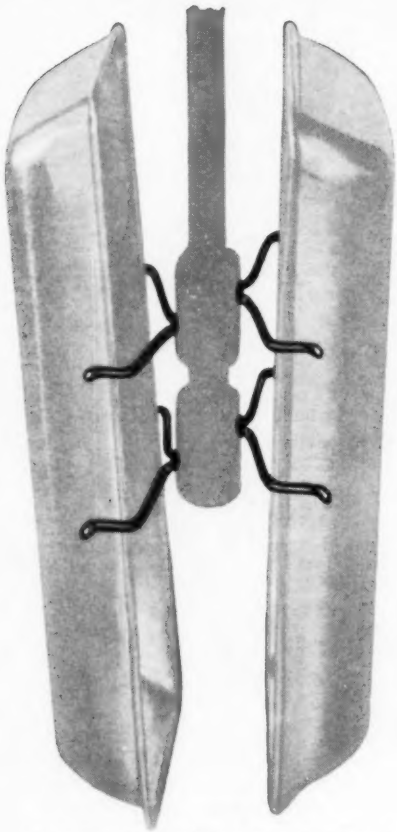
REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

REPUBLIC TITANIUM

displaces aluminum and increases anodizing rack life 100 times



Experimental anodizing racks utilizing Titanium have proved so successful that plans are being made for quantity production. New design will take full advantage of the properties of Titanium for the entire assembly.

Up to now, aluminum has been considered to be the most satisfactory rack material for the anodizing of ice trays and grids.

But, its use has been expensive and time consuming. For example, prior to each anodizing cycle a stripping operation is required to remove the anodic film formed for electrical contact on the previous cycle. And, during each anodizing and stripping cycle a considerable amount of aluminum is dissolved from the racks.

Recently one manufacturer of ice trays and grids switched to commercially pure Republic Titanium for use in anodizing racks. Titanium has proved to be an excellent rack material. It not only resists the chemical attack of the cleaning, etching, brightening and anodizing solutions, but also eliminates the need for the stripping operation. The thin, adherent oxide formed will conduct electricity and, therefore, does not have to be stripped off after each anodizing cycle.

While the initial cost of Titanium is higher than that of the former material, elimination of the stripping operation and increased rack life more than compensates for the increase in cost. The manufacturer's laboratory tests indicate that rack life will be increased more than 100 times.

Does this give you an idea for chemical equipment or for low-maintenance metal parts that must stand up to the most severe service? Then talk it over with Republic. You'll get complete information from the experienced leaders in corrosion-resistant metals.

REPUBLIC STEEL CORPORATION
3104 East 45th Street, Cleveland 27, Ohio

Please send more information on these Republic products:

☐ Titanium & Titanium Alloys
☐ ENDURO® Stainless Steel ☐ Semi-Rigid Kralastic
☐ Dekoron®-Coated E.M.T.

Name_____ Title_____

Company_____

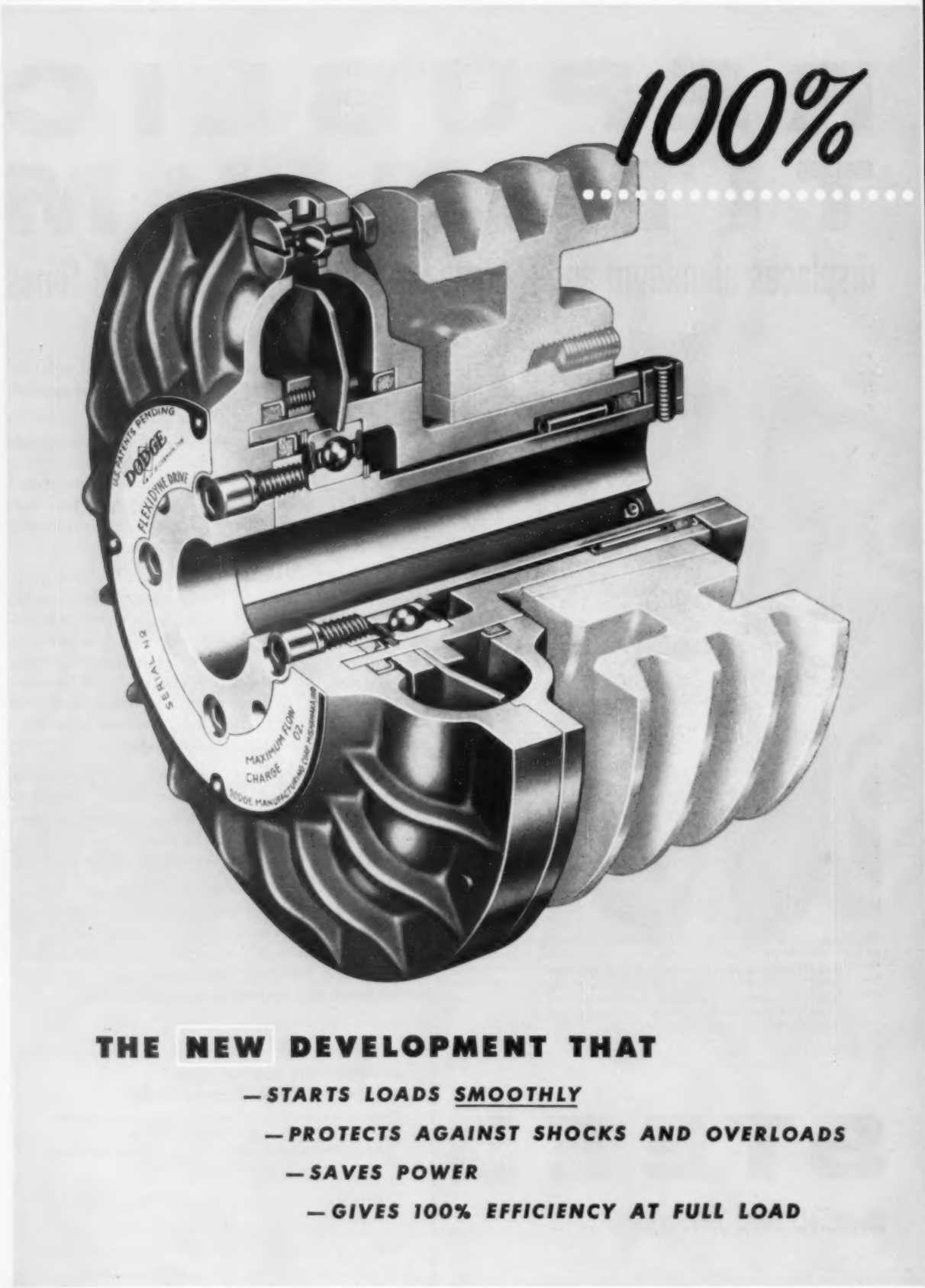
Address_____

City_____ Zone____ State_____

C-1087

STEEL

and Steel Products



THE NEW DEVELOPMENT THAT

—STARTS LOADS SMOOTHLY

—PROTECTS AGAINST SHOCKS AND OVERLOADS

—SAVES POWER

—GIVES 100% EFFICIENCY AT FULL LOAD

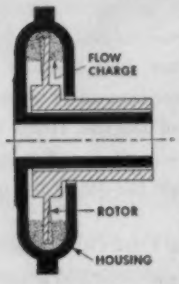
Efficiency at Full Load!

FLEXIDYNE

THE DRY FLUID DRIVE

Field experience proves that the new principle employed in Flexidyne provides a better way to handle difficult drive problems.

The "dry fluid" in Flexidyne is heat treated steel shot. A measured amount, called the flow charge, is contained in the housing, which is keyed to the motor shaft. When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, wedging it between the housing and the rotor which transmits power to the load.



After a momentary slip between housing and rotor the two become locked together and achieve full load speed without slip and at 100% efficiency during the running cycle.

Flexidyne is easy to select *off the shelf.* Each size has a standard horsepower rating, yet the flow charge can be varied quickly to give you tailor-made torque to suit the job.

Write for bulletin A-640, or call your Dodge Distributor now about Flexidyne Drives and Flexidyne Couplings.

DODGE MANUFACTURING CORPORATION
800 Union Street, Mishawaka, Indiana

FLEXIDYNE AT WORK TURNS IN GREAT PERFORMANCE RECORD!

Flexidyne Drives and Couplings are now being delivered from stock. Already reports like these are coming in about Flexidyne performance in many tough assignments.

RAILROAD CAR PULLERS
"Starts fine... summer or winter!"

CONVEYORS
"We start under full load now!"

COTTON CARDS
"Finally... the soft start!"

TRAVELING CRANES
"Spots our loads... and how!"

PUMPS
"Now we are using smaller motors, too!"

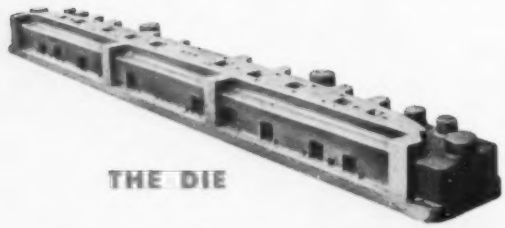
VENTILATING FANS
"Takes off smooth as silk!"

...AND OTHER HEAVY INERTIA LOADS
"Wonderful performance!"

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone book, or write us.

DODGE
of Mishawaka, Ind.

AT NEMCO FOUNDRY: ANOTHER PROBLEM SOLVED BY CITIES SERVICE CORE OIL

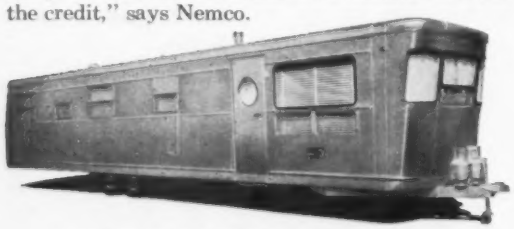


THE DIE

The die pictured here was cast at Nemco Foundry for use by the Spartan Aircraft Company in producing roof ribs for its Spartan Mobile Home. Difficult to produce, it required 10 cores 2⅝" x 2⅝" square and 25 cores, quarter-circle in shape, from ¾" to 1" in diameter. Semi-circular shape was necessary to core curved slots from top of die to sides. Holes had to be clean and free from obstruction, allowing stamped slugs to fall through. Nemco relied on Cities Service Delco Core Oil to help meet exact specifications. "A smart choice," says J. A. Dean, General Manager. "Delco Core Oil made the job far easier."

THE ROOF RIBS

The roof ribs of this Spartan trailer, cast from the die produced at Nemco, are visual proof of a job well done. "The great strength and high collapsibility of Cities Service Delco Core Oil share a lot of the credit," says Nemco.



THE FINISHED PRODUCT

The finished product is this handsome Spartan Mobile Home awaiting shipment to consumer. Spartan's rigid specifications help make it one of the safest and best on the market.

Difficult casting of die to form roof ribs for Spartan Mobile Home made easier by Cities Service Delco #36

Located in Tulsa, Oklahoma, Nemco Foundry enjoys attacking the really tough jobs and making them easier. And often helping to spearhead the attack is Cities Service, as described here by J. A. Dean, General Manager:

"Recently Cities Service Delco #36 Core Oil again solved a tough job for us in fulfilling the requirements for a casting for the Spartan Aircraft Company, makers of Spartan Mobile Homes. The casting was a bottom shoe for blanking die to make roof ribs for the all-aluminum shells for Spartan trailers.

"The die was of Nemcoloy, Type AL, an alloyed grey iron. It was 106" long, 8" thick and 13½" wide, and weighed 2,018 lbs. cleaned.

"It required 10 cores 2⅝" x 2⅝" square. In addition, it demanded 25 cores, quarter-circle in shape, ranging from ¾" to 1" in diameter. Semi-circular design was necessary in order to core curved slots from the top of the die to the sides of the die. Holes had to be clean and free of obstructions allowing the stamped slugs to fall through the die to the outside and not hang up.

"Cities Service Delco #36 Core Oil enabled us to meet these requirements perfectly. We certainly recommend it where great strength and high collapsibility are needed."

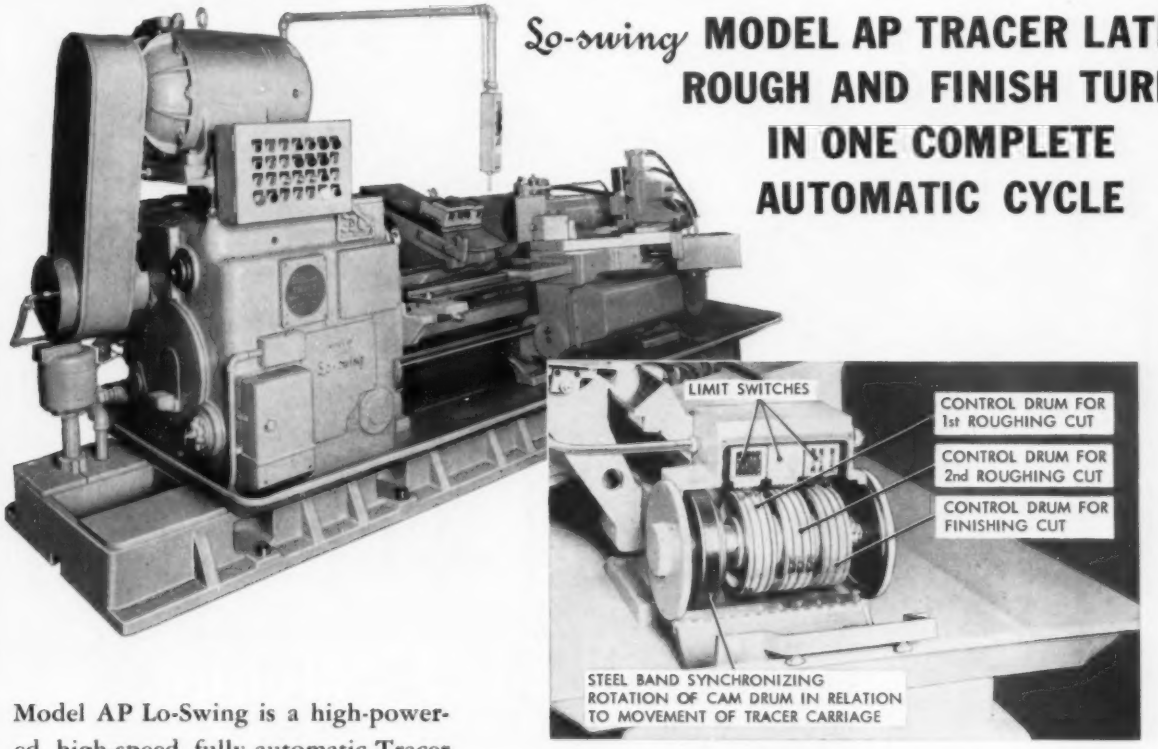
Like Nemco, scores of other foundries have reported unusual results with problem-solving Cities Service Core Oils. Nor does the praise end with the product . . . for time and again the solution for the proper core oil has resulted from the knowledge, understanding and experience of a Cities Service Lubrication Engineer. If you have a lubrication problem, why not talk it over with one of these Cities Service experts? Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Ill.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK


LIMIT SWITCHES
CONTROL DRUM FOR 1st ROUGHING CUT
CONTROL DRUM FOR 2nd ROUGHING CUT
CONTROL DRUM FOR FINISHING CUT
STEEL BAND SYNCHRONIZING ROTATION OF CAM DRUM IN RELATION TO MOVEMENT OF TRACER CARRIAGE

Lo-swing MODEL AP TRACER LATHE ROUGH AND FINISH TURNS IN ONE COMPLETE AUTOMATIC CYCLE

Model AP Lo-Swing is a high-powered, high-speed, fully automatic Tracer Type Lathe which can be set up easily and can be operated by semi-skilled labor. Since it uses a simple type of master template to reproduce size and profile, it is well suited for small and medium lot production.

The illustration at right shows the graduated control drums which control all movements of the front tracer carriage and which initiate feed movement for the back squaring attachment when used. Control cams are graduated for rapid setting.

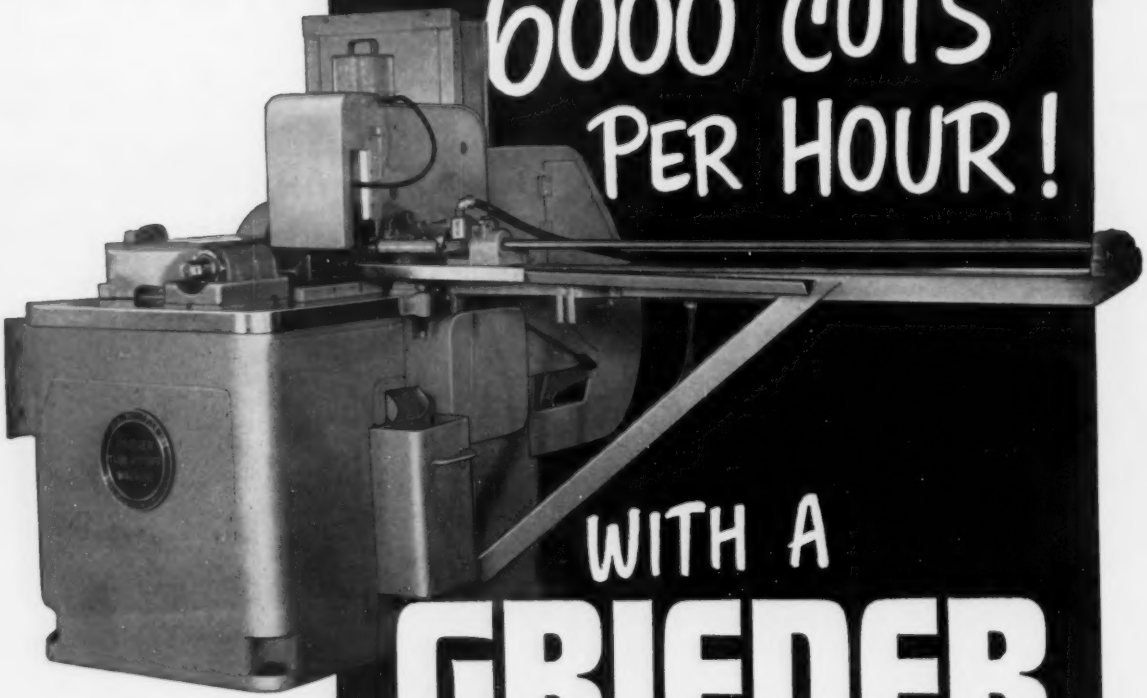
Write for Bulletin APT 56D

FEATURES OF THIS NEW LO-SWING TRACER LATHE

- Rough and finish machines in one complete automatic cycle.
- Back squaring attachments permit additional facing and undercutting operations synchronized in the machine cycle.
- Rapid traverse movement to the tracer slide advances cutting tool rapidly to the work and also relieves slide on the return stroke.
- Rack and pinion longitudinal feed permits long carriage travel.
- Motors up to 50 HP can be used on heavy roughing operations.

Lo-swing MODEL AP AUTOMATIC TRACER LATHE

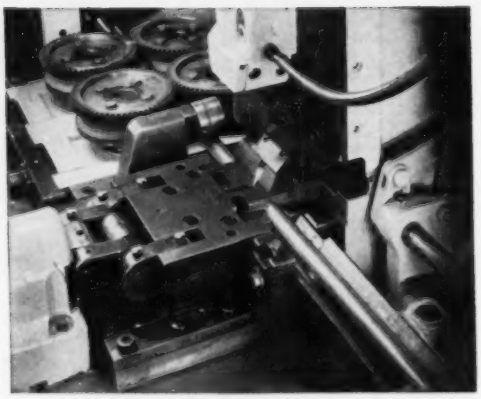
6000 CUTS PER HOUR!



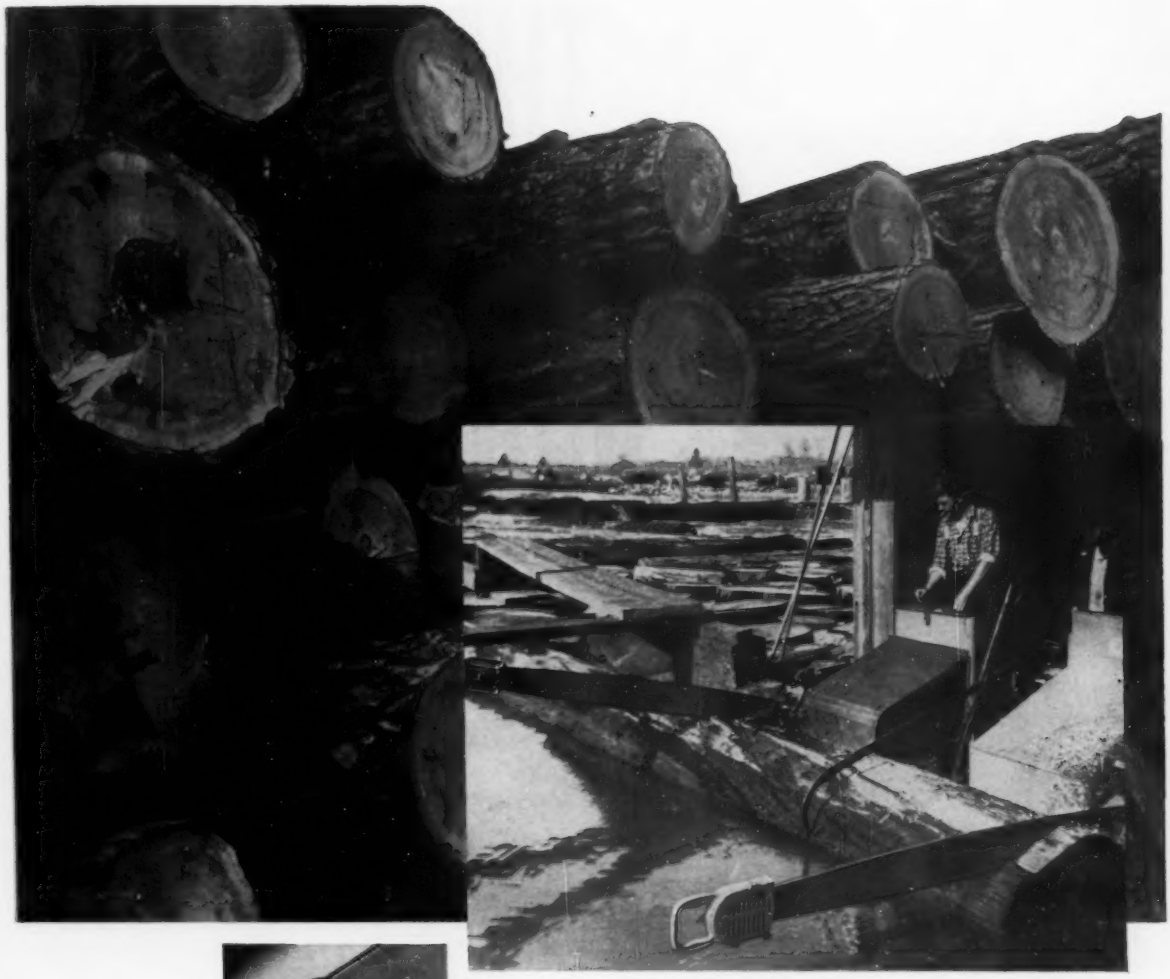
WITH A GRIEDER TUBE CUT-OFF MACHINE

NO DISTORTION... MINIMUM BURR...
ACCURACY WITHIN .002"...
CUTS ANY SHAPE...

Cut steel tubing at the amazing speed of 6000 cuts per hour. The Grieder Tube Cut-Off Machine features a heavy duty air operated combination clutch and brake unit that allows continuous operation at this terrific rate of production. Fully automatic... Rate of feed: 600 feet per minute ... True cutting. Get full information, multiply your tubing production, reduce costs, write *today*.



GRIEDER INDUSTRIES, INC.
BOWLING GREEN, OHIO



▲ L-M pond-type chain saws "bucking" log for a veneer plant.

◀ Close-up of MAX-EL alloy steel chain saw bar, showing depth of heat treatment for tougher, longer-lasting bars.

it takes MAX-EL Alloy Steel to take a beating like this

Ram the flying teeth of a chain saw against a heavy log – and watch the sawdust fly! But don't forget – backing up that speeding chain is a bar that has to absorb all the shock . . . yet keep the chain lined up accurately, dependably.

That's a big reason why leading chain saw manufacturers, like L-M Equipment Company, Portland, Oregon, specify Crucible MAX-EL® alloy steel for chain saw bars.

And there are other reasons, too. For MAX-EL is not only tough, wear-resistant and dependable . . . but it also shows outstanding response to heat treatment . . . excellent machinability . . . high uniformity . . . minimum distortion. It's these qualities that permit L-M to machine their saw bars first – *then* give them a graduated heat treatment that insures toughness at the edges . . . flexibility in the main section.

If your product requires a tough, machinable, non-deforming alloy steel – MAX-EL is for you. Try it. To see what information is available on MAX-EL – or *any* Crucible special steel – get your copy of the "Crucible Publication Catalog." Write *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

an important weapon in America's arsenal

THE WORLD'S LARGEST STEAM DROP HAMMER

Under a contract with the United States Government, Erie Foundry Company has recently delivered the eighth 50,000 lb. Steam Drop Hammer, the largest ever built.

Here are some of this all-steel hammer's dimensions:

Weight: 1,650,000 lbs.
Height, overall: 45 ft.
Height, floor line to top: 28½ ft.

The hammer was completely machined and assembled for factory pre-testing (a standard Erie Foundry Company procedure on all machines) in Erie Foundry's plant—a modern factory which is equipped with new giant machine tools to handle such large work.

Of special interest to hammermen is the 25 to 1 anvil ratio. The added anvil weight more fully utilizes this hammer's tremendous impact energy of 850,000 foot pounds. Like all Erie hammers, all stressed parts on the 50,000 lb. machine are *steel.*

With eight 50,000 lb. Erie Steam Drop Hammers in service and stand-by, our country is ready to forge the larger component forgings needed in the weapons of today and tomorrow.

the greatest name in forging hammers

ERIE

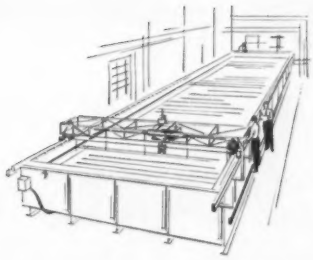
in our 61st year

WRITE FOR BULLETIN 355

ERIE FOUNDRY CO. ERIE, PA.

THIS ULTRASONIC DETECTIVE

"Sounds Out" Flaws in Metals



CURTISS-WRIGHT *non-destructive* ULTRASONIC TEST EQUIPMENT

Speeds Precision Inspection in Wide Range of Industries

Curtiss-Wright Non-Destructive Test Equipment uses "ultrasound"—high frequency mechanical vibrations —for precision production-quantity inspection of forgings, rolled plate, welded tubing, extrusions and other metal products.

A "search crystal" immersed in water is electrically excited to produce several million cycles per second. The resultant vibration passed through the liquid readily penetrates metals . . . then bounces back from the front or rear surface of, or from interior flaws in, the material. The flaws are translated into "pips"—visible readings on the cathode ray tube of the Curtiss-Wright Immerscope. The Immerscope, most important unit in the Curtiss-Wright test system, has a built-in alarm system which provides positive warning when flaws of a predetermined size are present. Scanning equipment for cross-sectional views, and a Flaw Recorder for keeping a permanent record of all data, are important accessories for complete automation in quality control.

Curtiss-Wright Ultrasonic Test Systems, and other important developments in ultrasonics, are serving many of the nation's leading industries. Complete information and engineering assistance available on request.

ENGINEERS • TECHNICIANS • SCIENTISTS

Curtiss-Wright has permanent career positions open for specialists in advanced engines and propellers, metallurgy, electronics, nucleonics, ultrasonics, plastics and chemistry. New 85-square-mile Research and Development Center at Quehanna, Pennsylvania and expanded divisional engineering programs are creating opportunities for more engineers, technicians and scientists in both aviation and diversified industrial projects. . . . Write to: Engineering Placement Department, Curtiss-Wright Corporation, Wood-Ridge, New Jersey.

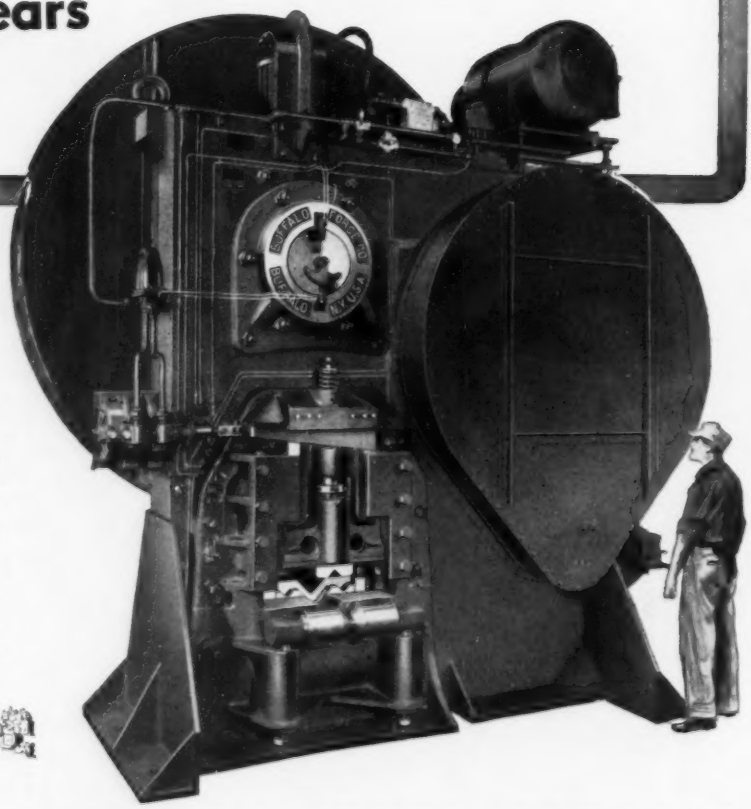
INDUSTRIAL AND SCIENTIFIC PRODUCTS DIVISION

CURTISS-WRIGHT

CORPORATION • CALDWELL, N. J.

ECONOMY in FORGING STARTS with the CUTTING!

YOU CAN STEP UP OUTPUT and QUALITY with "BUFFALO" Billet Shears



First, the high cutting rates of "Buffalo" Billet Shears step up your production. The big No. 17 at right shears six 9" squares or 10" rounds per minute, and speeds are correspondingly higher in our smaller models. Second, your cuts are clean, square and uniform. The knife penetrates only 3/16", localizing an accurate vertical fracture. *Write today for Bulletin 3295-B and see the "Q" Factor* features that make "Buffalo" Billet Shears your most economical and accurate means of preparing stock for forging.*

**The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

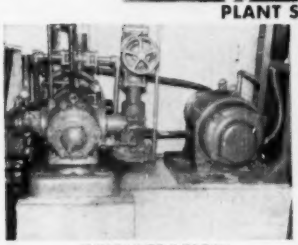
BUFFALO FORGE COMPANY

492 BROADWAY BUFFALO, NEW YORK

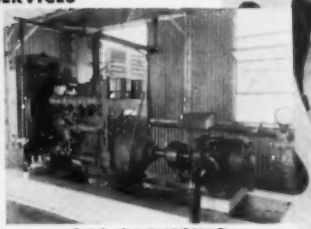
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING

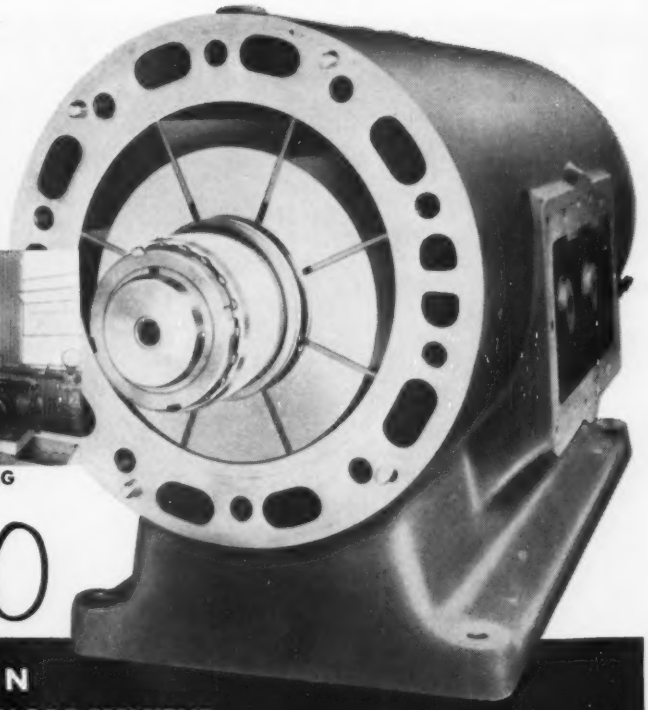
PLANT SERVICES



REFRIGERATION



GAS GATHERING

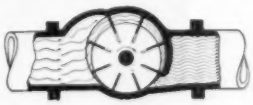


Since 1930

. . . FULLER ROTARY MOTION has been the key to SMOOTHER, MORE EFFICIENT, LOWER COST AIR COMPRESSION

The unique revolving principle pioneered by Fuller is the heart of the Fuller Rotary Compressor—both single- and two-stage types—and provides impressive cost, maintenance and operating advantages.

Simplified Fuller design consists essentially of a rotor eccentrically mounted in a cylinder to form a crescent divided into sections by the rotor blades. Each section or pocket carries air from one end of the crescent to the other without reversal of flow and with measurable improvement in volumetric efficiency. The rotor blades move freely by centrifugal force alone and compensate automatically for wear. As a result, Fuller Rotaries can operate indefinitely without care and the occasional inspection check required can be made with fewer men and in far less time.



Clip, fill in and mail the coupon for detailed information about Fuller Rotary Compressors for plant services, refrigeration or gas gathering.

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
A SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORP.
Chicago • San Francisco • Los Angeles • Seattle • Kansas City • Birmingham

Fuller
pioneers in harnessing AIR

G-285
13002

COST-SAVING ADVANTAGES

1. Smooth, pulse-free, one-way air flow
2. Almost complete lack of vibration permits use of light foundation
3. Far fewer moving parts insure low maintenance
4. Small size for high capacity permits installation in minimum space
5. Direct drive further reduces space requirements
6. Valveless design permits continuous, unsupervised operation and greatly reduces maintenance

Fuller Rotary Compressors:

- Maintain original capacity for the life of the machine
- Provide a high degree of reliability, thereby reducing standby capacity requirements
- Have few moving parts, thus sharply reducing parts inventory
- Require minimum supervision and inspection

It will pay you to compare Fuller Rotaries with other compressors and evaluate Fuller advantages to your operation in terms of annual net savings. Fuller Rotaries are available for industrial pressures to 125 psig and capacities to 3300 cfm. We will be glad to supply you with facts based on actual experience with Fuller installations over the past 25 years.

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.

Please send me, without obligation, descriptive literature on the Fuller Rotary Compressor. I am specifically interested in a pressure of _____psig and a capacity of _____cfm, to be used for:

NAME_____ ☐ Plant Services
TITLE_____ ☐ Refrigeration
CO. NAME_____ ☐ Gas Gathering
STREET ADDRESS_____
CITY_____ ZONE_____ STATE_____

EC&M 'EDDYMAG'® AC Hoist Control

assures PRECISION DIE-HANDLING with ALL Lowering Speeds SAFE

® Registered EC&M Trade Mark — U.S. Patent Office

In this busy Press Metal Fabricating Dept. of a mid-west automobile manufacturer, EC&M EDDYMAG Hoist Control gives precise hook speeds for the many precision handling tasks encountered. Changing dies, or in the handling of raw and finished stock, a smooth and fast flow of production is guaranteed by this EC&M Controlled Crane.

By selecting this latest development in magnetic control for AC hoists operated by wound-rotor motors, plant management is assured of maximum safety with high output. In addition to EDDYMAG Hoist Control, EC&M Frequency Relay Controllers are used on the Bridge and Trolley motions, and an EC&M Manual-Magnetic Disconnect Switch provides a safe and easy disconnect means to remove power from the crane. Before buying cranes, investigate this simple, safer Control by EC&M.

For complete details on EDDYMAG Hoist Control write for Bulletin 9300.

BRAKING TORQUE ADJUSTED AUTOMATICALLY BY THIS SELF-REGULATING HOIST CONTROL.

When there is a demand for more braking to maintain the lowering of a heavy load at constant speed, EC&M EDDYMAG Control supplies the increased torque automatically. Any tendency for the motor to speed up increases the eddybrake torque to insure safer lowering. EC&M uses the simplest of Magnetic Amplifier to accomplish these results.

Floor-operated Crane in receiving dept. is also EDDYMAG and EC&M Frequency Relay Controlled.

6700

THE ELECTRIC CONTROLLER & MFG. CO.

DIVISION OF SQUARE D COMPANY

4498 Lee Road • Cleveland 28, Ohio

If CORROSION is a problem...

HOMESTEAD *Lever-Seald* VALVES

WILL *SOLVE* IT!

In leading chemical plants, refineries, paper mills, textile plants, steel mills and hundreds of other industries HOMESTEAD Lever-Seald Valves have virtually put an end to valve operating problems. Corrosive or viscous fluids, extremes of temperature or pressure or other adverse conditions that cause ordinary valves to stick or seize, simply cannot affect HOMESTEAD Lever-Seald VALVES. For built into each valve is a powerful lever-and-screw device that prevents sticking and assures positive action at all times, under all conditions in services ranging from 40° below zero to 1100° Fahrenheit.

HOMESTEAD Lever-Seald VALVES are available in straight-way, three-way, and four-way types, with screwed or flanged connections, in Semi-Steel, Steel, Ni-Resist, Stainless Steel, Monel or other alloys from 1″ to 12″, for vacuum to 1500 lbs. They are also furnished for pressure gun lubrication if desired.

If Corrosion . . . Temperature . . . Pressure . . . or fluid contamination is a problem, why not solve it by changing to HOMESTEAD Lever-Seald VALVES today.

MAIL THE COUPON TODAY for VALVE REFERENCE BOOK No. 39-3.

Name _____ Title _____

Company _____

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Bulky products unitized for faster handling

ACME STEEL STRAPPING helped eliminate slow, costly manual handling of zinc slabs at The Anaconda Company, Anaconda, Montana. Each day over 700,000 pounds of zinc are unitized by stacking and strapping and then loaded in freight cars by lift truck. And it's done in ⅓ the time of former hand loading. (Idea No. U6-3)

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***Check YOUR Acme Idea Man today.** He will show you examples of many similar Ideas-In-Action. He can use his experience to adapt these ideas to your needs. Write to Dept. EF-26, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Ill. In Canada, Toronto, Ont.

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Acme Idea Man Don Hughes services and supplies ideas to The Anaconda Company

ACME STEEL STRAPPING

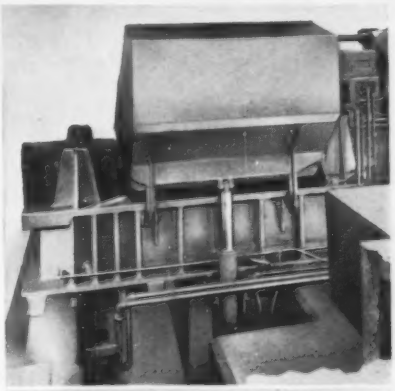
ACME STEEL

Now one man can PUSH-BUTTON-OPERATE one or several Dempster-Balesters!

1

ONE PRESS may be the Dempster-Balester Model 129. Another the Model 351. Another the Model 701, etc. Each may be the same model, or there may be several of one model, one of another. In addition, one or all may be fully equipped with exclusive Dempster-Balester Auxiliary-Compression Door that enables you to bale in a 1-2-3 continuous cycle. This Auxiliary-Compression Door does not "beat" or "tamp" the scrap. It actually penetrates into the charging box, hydraulically compressing the scrap with a 45-ton force!

Do you need one Dempster-Balester or several? What model? With or without Auxiliary-Compression Door? With or without push-button control panel? Should your press produce one particular size bale, or be equipped to produce different size bales? Isn't it time we got together? Tremendous savings are yours with the right press, properly engineered and equipped to meet your particular requirements. Ask us to give you complete information. *A product of Dempster Brothers, Inc. Sold in Canada by the W. P. Favorite Co., Ltd., 418 Main Street East, Hamilton, Ontario.*



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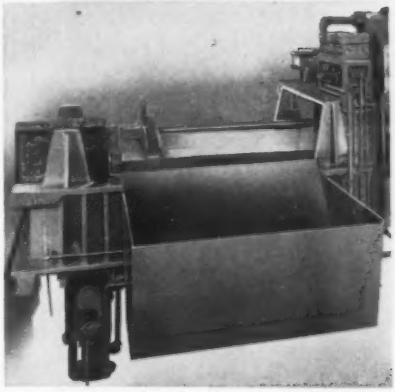


3

Photo 1 shows push-button controlled Skip Pan loaded. Photo 2 shows it dumping scrap metal into charging box. When Skip Pan returns to be re-loaded, Charging Box Door moves out, pushing last bale forward, clear of charging box (see Photo 3). Bale ejector returns to lowered position. Pusher heads (rams) proceed to bale the scrap and then automatically retract. Charging Box Door opens, bale is ejected and Skip Pan, which has been re-loaded, is ready to dump another load into box for baling.

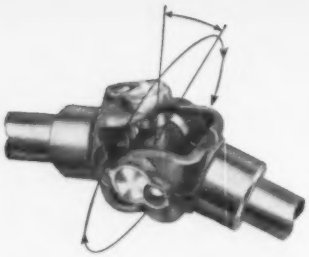
DEMPSTER BALESTER®

5200

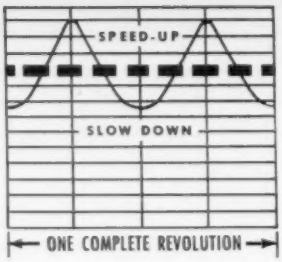
DEMPSTER BROTHERS, 426 N. Knox, Knoxville 17, Tennessee

FACTS...

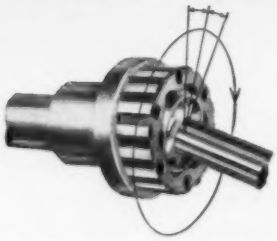
on a Universal Joint that cuts costs, increases production in steel-making equipment



During rotation at a given angle, pin- or slipper-type joint speeds up, slows down twice during one revolution.



Solid line shows speed variation for one revolution of pin- or slipper-type joint at a critical angle. Note constant velocity of 100% for Rzeppa Joint (dotted line).



Due to its construction features, the Rzeppa Joint always transmits a smooth flow of power even at unbalanced angles. The standard joint cannot meet this test without involved compensating measures.

IN THESE TYPICAL APPLICATIONS

Among the many applications where Rzeppa Constant Velocity Universal Joints are ideally suited are:

- Blooming Mills
- Billet Mills
- Merchant Mills
- Skelp Mills
- Butt Weld Pipe Mills
- Electric Weld Tube Mills
- Hot Strip Mills
- Cold Reduction Mills
- Auxiliary Equipment

The above facts prove why you can expect superior performance when your steel-making equipment utilizes Rzeppa Constant Velocity Universal Joints. Rzeppa's *modern design* offers you all these advantages:

- INCREASED SPEEDS
- REDUCED DOWN-TIME
- LOWER MAINTENANCE
- HIGHER CAPACITIES

The next time you are considering universal joints for replacement or original equipment—why not look into the exclusive features offered only by Rzeppa.

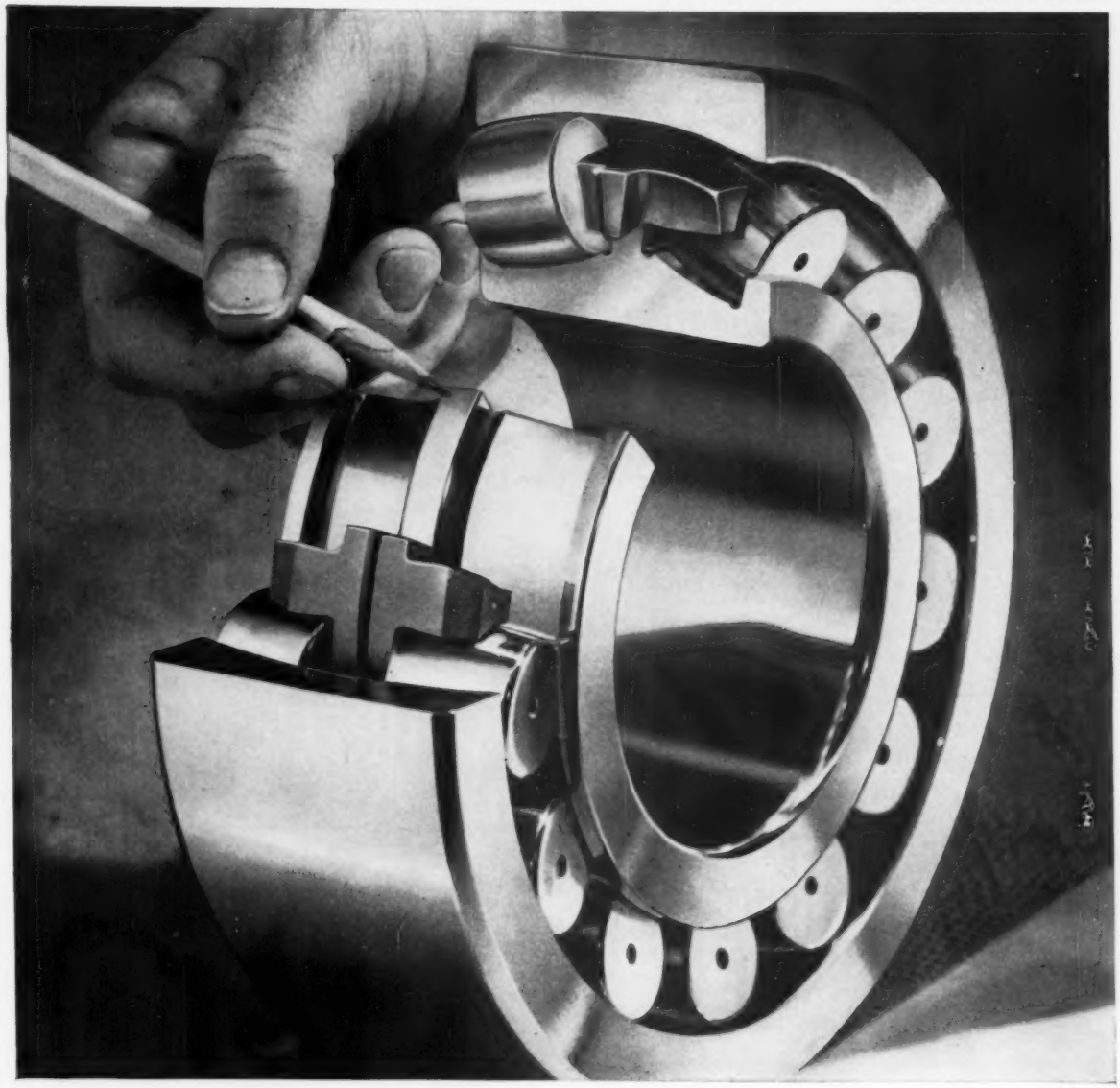
WRITE TODAY . . . for this complete brochure which offers you many more FACTS on Rzeppa Constant Velocity Universal Joints.

RZEPPA

("SHEPPA")
CONSTANT VELOCITY UNIVERSAL JOINTS

THE GEAR GRINDING MACHINE COMPANY
3917 CHRISTOPHER, DETROIT 11, MICHIGAN
Manufacturers of: Fully Automatic Gear Grinding Machines • THE DETROIT SCREWMATIC 750

TORRINGTON *SPHERICAL ROLLER* BEARINGS



"This flange guides the rollers to peak performance!"

The center flange on the inner raceway of the TORRINGTON Spherical Roller Bearing positions the rollers to handle thrust loads. This accurate positioning also assures radial stability of the rollers under heavy loads—even at continuous high speeds and under conditions of misalignment.

This superior design feature is only one of many advantages you get when you specify TORRINGTON. For example, you get the service of TORRINGTON'S experienced engineers, who will help you with design and maintenance problems—or design custom bearings for special applications.

For long, low-maintenance service in heavy-duty applications, order TORRINGTON Spherical Roller Bearings. They're available from stock with either straight or tapered bore, for shaft or adapter mounting.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District offices and distributors in principal cities of United States and Canada

90th ANNIVERSARY 1865–1955

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller
Needle • Ball • Needle Rollers

THERE'S A **METAL BLAST** ABRASIVE FOR EVERY CLEANING REQUIREMENT

Revolutionary, new type abrasive—cut from high-quality alloy steel. Work-hardening—outperforms all others!

Chilled shot and grit—for blast cleaning of large, heavy jobs. Unexcelled for toughness, long life, better cleaning.

TRY ONE OF THESE THREE *and* SEE!

Malleable shot and grit—for less severe cleaning and scale removal. The finest malleable shot on the market!

Yes, see for yourself, why more and more METAL BLAST abrasives are being used in blast cleaning departments all over the country. A trial order will prove to you that these are *good* abrasives—that they clean fast and efficiently, and help keep cleaning costs to a minimum. Pick out the METAL BLAST abrasive that fits your requirements—send for a trial order—and see for yourself!

METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO

New cost-saving feature built into doughnut fryer...

with *Carpenter* Diamond-Shaped Stainless Tubing

• A new feature in this volume doughnut fryer is the use of super sanitary heating tubes made from diamond-shaped Carpenter Stainless Tubing. The diamond shape permits faster, more economical heating because of the greater heating surface in contact with the fat. Doughnut crumbs cannot settle on the tubes, making cleaning easier and preserving the fat longer.

This is just one more example of combining the inherent advantages of stainless—high strength-weight ratio, fine appearance, corrosion and abrasion resistance and super sanitation—with the extra benefits of special shapes of Carpenter Stainless Tubing. Why not investigate the possibilities of designing and building the advantages of Carpenter Stainless Tubing shapes into your products. Call your nearest Carpenter Distributor or Branch Office for consultation and information.

MEMBER

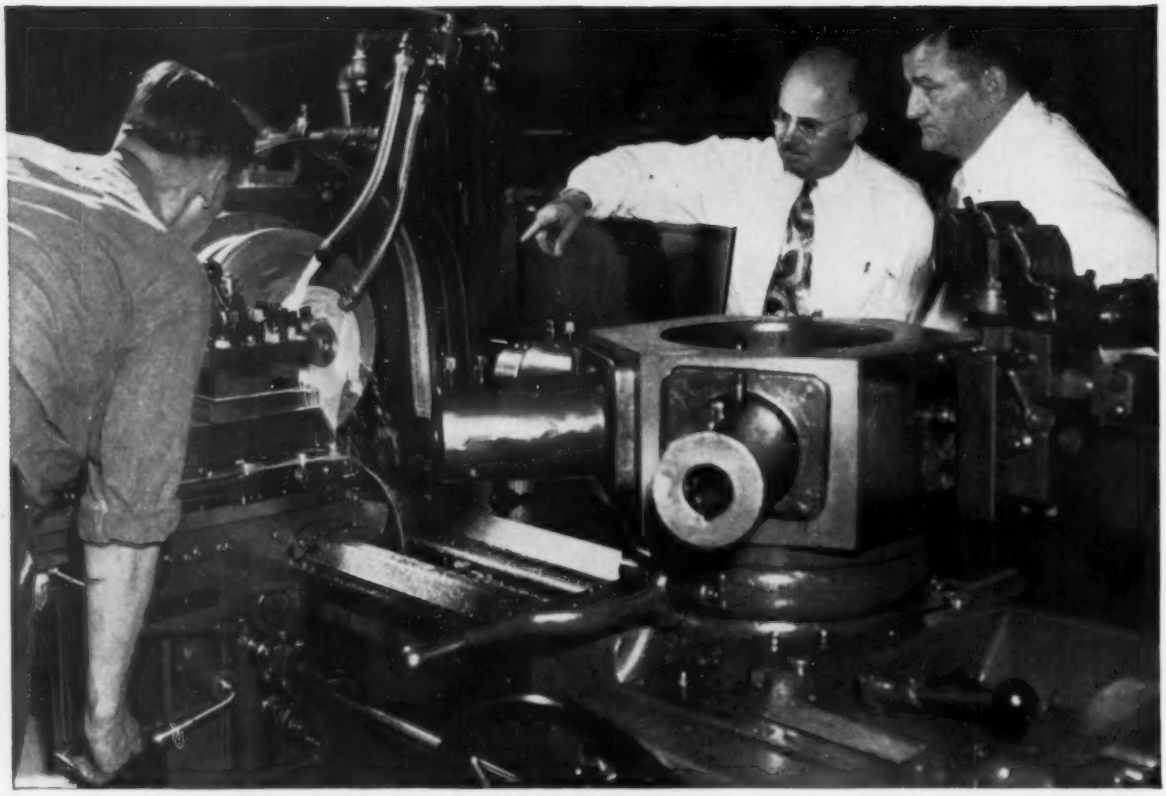
The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

Carpenter

more than corrosion resistance

Stainless Tubing & Pipe



Built right – Sold right

WARNER & SWASEY MACHINE TOOLS have established enviable records for high productivity, low maintenance and minimum downtime. They've *proved* their dependability – holding their accuracy for years after they have paid for themselves. They're *built right!*

Warner & Swasey's principle of design plays an important role in this success. Each model is *individually designed*–from the floor up–to handle a *specific range of work.* Machine handling time is thus minimized.

Skilled craftsmen, working to exacting Warner & Swasey standards, combine the most modern machines and processes with certain time-honored hand techniques–so necessary to insure the traditional Warner & Swasey accuracy.

And Warner & Swaseys are *sold right!* By turning specialists who follow a rigid Warner & Swasey policy–that they recommend and sell a machine *only* when it completely fulfills the requirements of your particular work.

These turning specialists are also at your service long *after* the order is written. Your nearest resident Field Representative, one of 47 located throughout the country, is quickly available to you. He's ready to lend his training and experience to help you ***maintain*** the high productivity of the Warner & Swaseys in your plant.

So whatever your turning needs . . . whether it's a machine for a specific job, or if you're looking for greater production through modernization–call in your nearest Warner & Swasey Field Representative.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

NEWSFRONT

Auto Schedules Revamped

Another drop in sales and a further increase in new car stocks have caused automakers to change their production schedules once again for the first quarter. Plans now call for production of 1.9 million cars and trucks. Originally, the industry planned to build more than 2 million vehicles during the first three months.

Report Hits Shot Peening Effectiveness

A recent report on shot peening casts considerable doubt on the effectiveness of stress relieving low alloy steels. Seems that the improvement in fatigue properties gained by shot peening these steels was not measurably affected even after 100 hours of stress relieving at 700°F. This can be taken to mean that the imposed peening stresses were in no way altered or simply that a certain amount of stress relieving is a waste of furnace time.

Too Many Formulas?

Are coolant and cutting fluid manufacturers developing too many formulas for machine shops to keep up with? Several methods engineers said "yes" and none said "no" in a recent informal survey. One methods man says, "They (coolant salesmen) want to sell us a new formula for every mite-different machining job we take on." He adds, "What we really need is more standardization to let us install and benefit from central coolant supply systems."

Stainless Steel Producers Need Relief

Stainless steel producers are becoming edgy over the outlook for nickel. Some mill inventories are scraping the bottom of the barrel. Others are approaching the danger point. Production of nickel-bearing stainless has been affected at some mills. And unless some relief is forthcoming in the next month or two, other producers will be in the same plight.

Gas Analysis Cuts Reject Rate

Interest in infrared gas analysis equipment for measuring and controlling CO or CO_2 in protective atmosphere generators used with heat treating furnaces is mounting. One major producer cut wire annealing rejects from near 50 pct in some cases to less than 5 pct; another markedly improved metallurgical characteristics of tinplate on continuous annealing lines.

Engineering Recruitment: Soviet Style

Although some sources now express surprise at apparent effectiveness of the USSR engineering recruitment program, it stems directly from a "job freeze" law in effect since 1941. According to its provisions, no worker can leave his job without official permission which—as a rule—is never forthcoming. Notable exception: Any worker who qualifies for admission as a student to an advanced technical school.

Get Ready For The Raid—

If one of the country's estimated five to six thousand nuclear-trained engineers or scientists works for you, cherish him. AEC's Chairman Strauss estimates that two to three thousand such scientists and engineers will be needed per year over the next 20 years. A recent survey shows that industry expects to get half during the next three-year period by hiring them rather than training them—from each other, that is.

Simple Test Checks Coating Uniformity

A simple-to-operate dip test, developed by a major aluminum producer, checks uniformity and aids in estimating thickness of aluminized coatings on steel. Rapid and reliable, the method utilizes a newly formulated hydrofluoric acid-copper fluoride solution.

From Grinding Wheels To Bearings

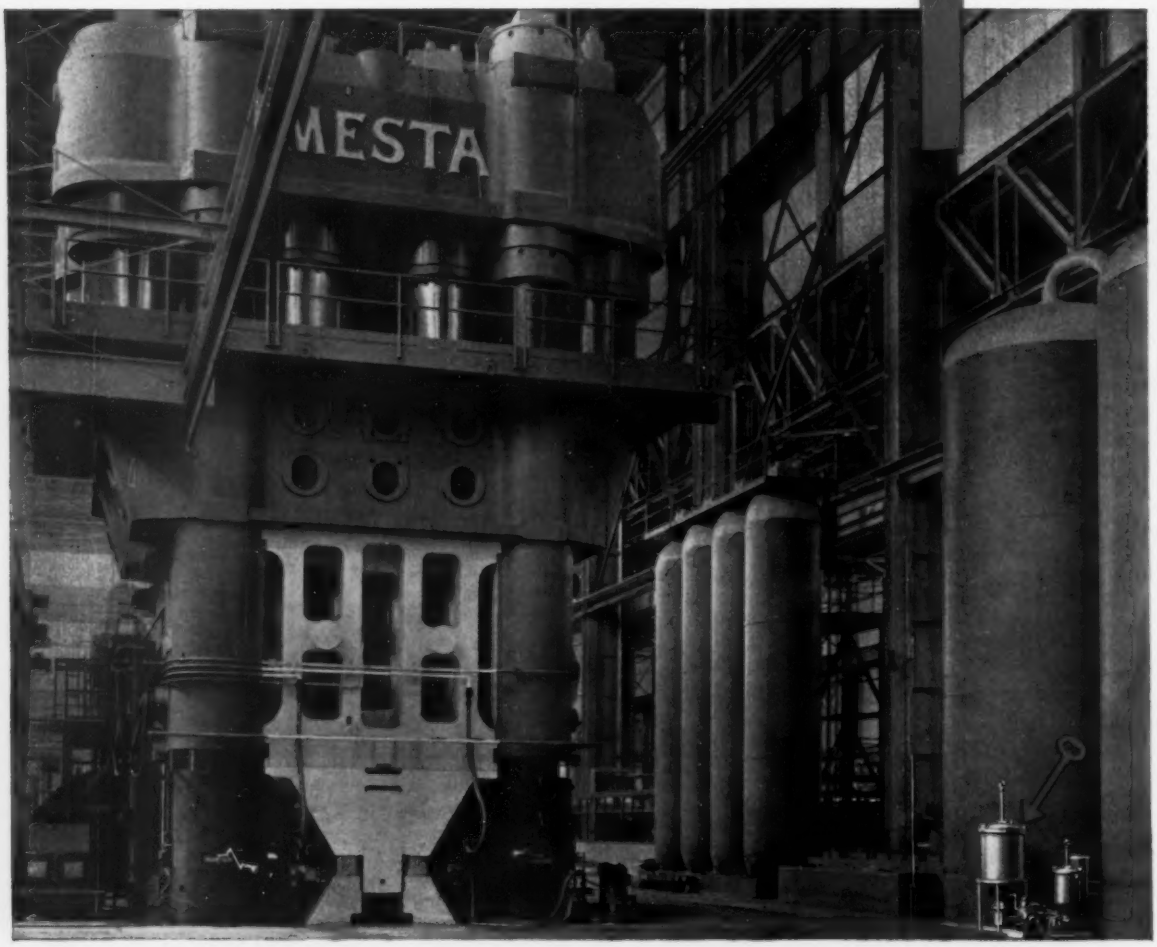
Aluminum oxide, the well-known grinding wheel constituent, is getting serious attention as a high-temperature bearing material. Tests thus far show that the oxide, when running on itself, has good anti-friction properties if not loaded too heavily.

Wheels Help To Shift Population

An increase in two- and three-car families is reflected in population growth over the past 5 years. While U. S. population grew 11.8 million, growth in suburbs was 9.6 million.

Farval automatic system lubricates world's largest forging press at Alcoa

FARVAL—
Studies in Centralized Lubrication No. 185



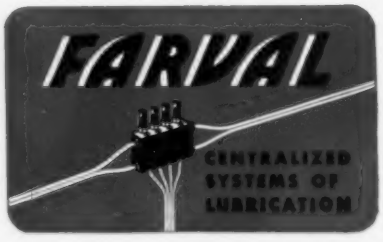
KEYS TO ADEQUATE LUBRICATION—
Wherever you see the sign of Farval—the familiar central pumping station, valve manifolds, dual lubricant lines—you know a machine is being properly lubricated.

The Farval central stations, visible at lower right, serve this 50,000-ton forging press.

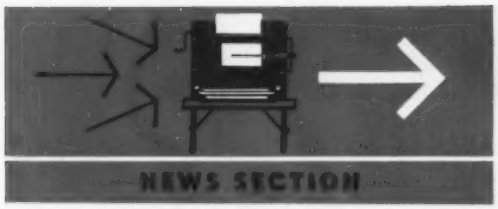
● Pioneer in lubricating presses of all sizes, Farval was chosen to lubricate this 50,000-ton Mesta Press installed recently in the Cleveland works of the Aluminum Company of America.

With equipment of this size, the importance of a lubrication system increases many fold. It *must* be adequate. It *must* be dependable. It *must* function without shutdown. Farval fills the bill—delivering oil or grease unfailingly, in exact amounts required whenever needed. The press is protected, man hours and lubricant saved, guesswork lubrication eliminated, steady production maintained.

You will find Farval representatives ready to serve you in all major industrial centers. See how Farval pays for itself many times over—write for Bulletin 26-R. The Farval Corp., 3282 E. 80th St., Cleveland 4, O.



Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing.
In Canada: Peacock Brothers Limited.



How New Extras Affect Your Steel Bill

Average increase in hot-rolled sheets and strip amounts to about $3 per ton . . . Plate extra revisions average $5 higher . . . Overall changes since last July average $1.30 . . . Reasons why—By *J. B. Delaney.*

◆ RECENT STEEL extra price changes have added approximately $3 per ton to the average price of hot-rolled sheets and strip. Changes announced by U. S. Steel and subsequently adopted by some other producers amount to an increase of 3 pct on the average price (including base and extras) of over $100 per ton.

On the same basis, revisions in extras on plates amounted to an increase of approximately $5 per ton. Percentagewise, the plate revisions averaged out to 5 pct.

Since last July, extra changes have increased the average price of steel approximately $1.30 per ton, or 1 pct, excluding the effect of changes in tinplate extras. Tinplate is sold largely on a contract basis to relatively few consumers, chiefly the can companies.

In the last seven months there have been extra revisions, both up and down, in a large number of products, including stainless steel, bars, strip and sheets, tinplate, plate, alloy blooms, billets, slabs, and ingots; cooperage hoop, tube rounds, carbon forging ingots, skelp, and others.

What's Behind It?

What's the reason behind these changes? Most important factors include wage and material costs and shifts in the pattern of "extras" specified by customers. The mills these days are keeping close tab on their production costs and revising their price structure accordingly, in order to maintain a reasonable profit level.

It's the old story that the customer pays for what he gets. If his method of operating calls for special requirements in the steel he uses, he pays accordingly.

Also, the mills are more alert than they used to be in finding "leaks" in their price structure. Some times it takes them a while to catch up with the "leaks," but it's usually not too long before they plug the holes.

Steel producers have learned the hard way that every product must stand on its own feet profitwise. That's why many companies have large staffs of pricing experts whose main job is to keep an eagle eye on production costs. The extras are the toughest to put a finger on.

Extras Take Longer

When steel wages and material costs rise, part of the cost usually is offset by increases in base prices. But revising the extras takes a lot longer. Figuring out the effect of wage and material cost changes is bad enough. But the picture often is complicated by changes in the pattern of extra requirements of consumers over a period of months.

For example, take the case of XYZ company, a steel customer. He decides to change his method of fabricating. But then he finds that the steel he had been using no longer does the job. So his metallurgists and the steel com-

WHEN steel consumers specify physical or chemical requirements, the mill tacks on an "extra" charge to compensate for the additional material or labor involved. Developing equitable charges for these extra operations is one of the toughest jobs confronting steel producers.

pany metallurgist get together and recommend changes. These changes are "built" into the steel he receives from the mill. The mill decides what the "extra" charge should be and bills the customer accordingly.

The catch is that the new "extra" may or may not be enough to compensate the mill for the added requirements of the customer. The mill doesn't realize this at the time but as changes accumulate from hundreds of customers, the effect begins to show up. Adjustments are made to compensate.

On top of that, the mills may decide to revise upward their ideas of what their operating "result" should be. For years, steel producers had been plagued by a relatively poor profit showing that drove potential investors away from steel stocks. Now, Wall Street, impressed by better steel company income reports, has been looking more kindly on steel as an investment.

What About Labor?

The mills also are faced with the problem of raising the money needed for expansion. And what few people realize is that increasing ingot capacity at the point of production calls for greater investment in facilities all the way back to getting iron ore out of the ground. Better earnings, through more realistic pricing, is one of the best ways to get the money.

Indications are that base and extra revisions this winter will average out to an increase of approximately $3 per ton. Most of this will represent "catching up" on increases in costs. Some will represent an effeort to help pay for expansion programs.

The mills will have to take expansion costs into account when they revise base prices after settling with the United Steel Workers in negotiations coming up this summer. After that, the price experts will have to take another look at their extras.

EARNINGS: They're The Tops

Steel profits in "55 were highest ever . . . Best previous year was 1950 . . . Industry is optimistic and expansion-minded . . . Financing is biggest problem ahead.

◆ STEEL EARNINGS in record-breaking 1955 were approximately 70 pct higher than in 1954, and some 50 pct better than in 1953.

Compared with the previous record year of 1950, earnings were up approximately 41 pct.

Industry leaders were unanimously optimistic concerning the outlook for '56, but none went so far as to predict a better year than in 1955.

Plans for expansion were a big topic of discussion at annual meeting press conferences. Bethlehem Steel talked of making its Sparrows Point plant the biggest in the industry, taking over the top spot from U. S. Steel's Gary Works.

U. S. Steel Record

Ways of financing these projects is the industry's biggest worry. Steel prices are certain to go up even further to help pay the bill. But the steel companies hope also to attract more equity capital from investors.

U. S. Steel's net of $370.2 million on sales of $4.1 billion was the highest in the company's history. Shipments reached an all-time high of 25.5 million tons. The company has lined up expansion and improvement projects that will cost some $550 million.

Republic plans to spend $152 million on expansion; National, $200 million; Jones & Laughlin, $250 million; Armco, $111 million.

E. G. Grace, chairman of Bethlehem, was never more optimistic concerning the outlook. He predicted his company would have good business throughout the year. Other company officials generally confined their optimism to the first half.

"We Are Confident"

C. M. White, president of Republic Steel Corp., said his company "Is booking orders, operating and shipping at capacity, and expects to continue at capacity rate throughout at least the first half of the current year."

J. L. Mauthe, president of Youngstown Sheet & Tube Co., said: "Steel operations have carried at virtual capacity into the current year and show promise of continuing at a high level at least during the first half of the year. All in all, we confidently anticipate that 1956 will be a year of good operations."

Steel Company Earnings—1955 And 1954

COMPANY	1955 12 months	1954 12 months	Fourth Quarter '55	Fourth Quarter '54
U. S. Steel	$370,200,000	$195,400,000	$102,700,000	$57,061,698
Bethlehem Steel	180,191,708	132,837,154	57,502,400	48,383,317
Republic Steel	86,271,491	52,875,164	.....	.....
Jones & Laughlin	50,104,000	25,032,000	15,269,000	8,498,000
National Steel	48,289,453	30,334,871	13,787,776	11,135,153
Youngstown	41,701,140	20,182,500	12,453,961	6,637,803
Armco Steel	64,288,000	41,100,266	18,903,014	11,931,788
Inland Steel	52,466,098	41,287,152	.....	.....
Wheeling	86,790,000	74,106,220	17,296,000	9,596,000
Granite City Steel	12,611,000	4,012,192	.....	.....

LABORATORY: Where New Sales Are Born

Industry's research bill is climbing . . . But management realizes that future products and sales originate in lab . . . Industry will spend more than $4.5 billion on research this year—*By K. W. Bennett.*

◆ MANY A SALES department's 1956 grey hairs will originate with one man in a white smock—working in the competitor's laboratory. Estimates on the dollar total that U. S. industry will expend for research vary from $4.5 billion to $6 billion. Both figures set new highs.

The dollar value of industrial research has been growing since the early 30's, skyrocketed in the past five years. Dr. Clyde Williams, director of Battelle Memorial Institute, values U. S. industrial research at $3,750,000,000 in 1954, at $4,100,000,000 in 1955, and believes that 1956 will see a $4,500,000,000 total. The figure is believed conservative.

RESEARCHERS delve into radiation phenomena in Armour Research Foundation experiment. Nuclear physics is one of many fields slated for bigger share of fattened industrial research budgets.

Some Spend 10 Pct

Nationally, industrial research expenditures are 1.1 pct of gross national product and will rise to 1.8 pct in 1956. Individual industries, notably aircraft, electronics, chemicals, and plastics, exceed the national average by substantial margins. Single companies are expending as much as 10 pct of their sales income on research projects.

Despite these averages, there is no formula telling the company president, "This is how much you will spend on research this year at least." A report published three years ago indicated the primary metal industries spent $17 per employee per year on research, and estimated that metal fabricating industries expended $11 per employee per year. Working laboratory administrators believe these are not efficient guides. Large or small, a plant must decide whether it can afford to continue with a low or non-existent research budget or how much it should spend.

For instance, a plant too small to maintain its own research staff took an aluminum solder that had "bugs" to a professional research organization recently. Sponsorship of research cost the company $1000. This sum is relatively small but to the sponsor it represented a handsome amount of working capital. The solder, like Cinderella, came home in a Cadillac. The sales outlook is excellent.

A small producer of special oil products employs only 17 men full time yet spent $30,000 a year on research for two years. The resulting product is selling like hot dogs at the series.

A small producer of rare earth metals is spending $15,000 per year in research laboratories though it has no lab facilities of its own. A small lead smelter spent $13,000 in a seven month period. All gained. A producer of small hand tools with a total payroll of 500 set up its own research lab two years ago with a staff of one young technical school graduate. This year he has a new title, "director of research" and the employer is seeking an assistant with similar talents. A sixth metalworker with an $81 million income spent $1 million on research in 1955.

A Few Rules

One man or twenty—the current question is, "How do you use an inplant research lab profitably?" Lab administrators suggest three rules of thumb:

A major heavy equipment producer drafts weekly meetings for

his sales department, production department, market research department, and top management—sitting with the laboratory staff to exchange ideas. Such weekly meetings are already regular practice at a number of large companies. All five branches compare new product ideas, and from these develops the programming of research projects. The lab staff is made an integral part of the production selling team. Those who have tried it say the importance of the meetings can't be over emphasized.

A second rule of thumb: Don't send a man to a boy's work. One producer of heavy equipment requires that each research man be backed with two assistants who do routine computing, wash the glassware, handle the paperwork. The day is dead when "The Doc" turned on the radiators in the morning and swept up at night. Larger firms are installing electronic computers. Electronic brains do routine problems that formerly required long hours of computation by high priced engineering personnel. A computer can be operated by a well trained secretary.

And top management must be constantly aware of what is happening in the lab. If a project is a fluke, it should be dropped immediately. Projects in progress are reappraised constantly.

Work With Department

The research director of an outstanding company lab has this to add: "We are working more closely with sales and management and our marketing group each month. But in the lab we figure we really have four assignments. In order of time consumed and relative importance, they are: First, new product development; second, improvement of manufacturing methods and existing products; third, we're a kind of fire department when something goes wrong in a product or manufacturing process. We're the boys who are called to straighten it in a hurry. Lastly, we're a kind of Bureau of Standards for our scattered company divisions. We drop in and do intensive periodic analyses on the product being manufactured, just to see that the machines are running right."

A well run lab is a boon to a manufacturer in a competitive market. But an increasing number of small firms without cash available for a full scale research laboratory are feeling the need for new products or research on old ones. Greater numbers are becoming convinced that they can operate and staff their own lab.

Others go to their trade associations requesting that the association sponsor needed research with the results available to all members. One estimate holds that the amount of research sponsored by trade associations increased by one-third in 1953-1954. Others hire a commercial research laboratory to improve existing products. For the past nine months, the Small Business Administration has listed private research firms and their particular research specialties. This works in improvement of existing projects, but new products aren't too often evolved in this manner.

SBA offers a recent aid here that is drawing interest. The agency lists worthwhile new patents for which the inventor is seeking a manufacturer who may want to buy outright, lease, or grant royalties to add the item to his manufacturing line.

Researchers in Demand

The scramble by industry for engineering and technical school graduates will be stiffer than the wild race of 1955. The average Bachelor of Science graduate started at $395 per month last year. This year at $415 to $425, he'll be a bargain. The services of a PhD could be purchased last year for $500 to $600. This year $600 to $700 per month will be the probable price range, varying widely with the degree to which a particular company desires a particular graduate.

The placement director of a midwestern university summed it up.

"The smaller firms want our graduates. And they'll pay them well. Trouble is — they have a bright work room waiting and they escort him in to a desk there with his nameplate on it. Then management decides he is a genius. Everybody tiptoes past the door for two weeks. The third week they're pounding on that same door and wanting to see "the new product."

"He needn't be handled as if he was a live bomb, and neither can he produce miracles. Research doesn't pay off overnight."

New Patent Listing Prepared

◆ DETAILED abstracts of more than 900 government-owned patents which private industry may use royalty-free are contained in a new U. S. Commerce Dept. publication.

These patents, acquired by the government in the 18 months ended last June 30, are described in the "Patent Abstract Series Supplement." It is an addition to the original seven volumes in the Commerce Dept. patent abstract series.

Patents listed in the supplement ordinarily can be used non-exclusively by private concerns without royalty payment to the inventor or the government. Inventions discussed cover a wide range of new products, new uses of raw materials, improved techniques, and advances in methods and processes.

Many of the patented ideas require a minimum of technical development. Those which do not meet the specific need of an industry may suggest new means of attacking perennial problems.

The 134-page supplement is sold at $3.75 by the Office of Technical Services, U. S. Commerce Dept., Washington 25. It may also be ordered through Commerce Dept. field offices.

SILVER: Will New Law Avert Trouble?

Consumption exceeds production, but government buying takes large share . . . Proposed law may ease market . . . But it would also invite market speculation and result in price fluctuation—By *F. J. Starin.*

◆ THERE COULD be trouble in the silver market. With annual consumption outstripping production, the inevitable tight market could result.

But don't bet your silver dollars on it. Pending legislation sponsored by a powerful coalition of senators may wipe out the old silver law that consumers feel has throttled the silver market.

With electrical and electronics fields supplying a big impetus, silver consumption by private industry in the U. S. jumped 18 pct in 1955 to a substantial 100 million oz. Production hasn't been able to keep up with consumption since 1951.

There is every reason to believe that this uptrend in industry use of silver will continue, and, there are no substantial new sources in the offing. But this is only half the story.

A buyer in the world open silver market must contend with shifting sources because of shifting availability of important reserve stocks, lend-lease obligations cutting into supply, and government policy, both U. S. and foreign. Most important, he must deal with the U. S. Treasury Dept., either in direct competition or as a source of supply.

Government Buys

According to the Silver Law (July 31, 1946) and previous silver legislation, the government is obliged to buy newly mined domestic silver. Eventually, some of this silver gets back to private industry because authority is given by the same law to sell silver at an approximate market price. The advantage to the consumer is that if silver is in short supply, buyers can always turn to the Treasury as a source.

Here's how it worked this year:

The largest commercial user of silver in the world is Handy & Harman. Exclusive of Treasury transaction, it is the biggest buyer of ingot silver in the U. S.

The company processes its silver at its Bridgeport, Conn., and other mills into sheets, strip, rod, wire, blanks, circles, anodes, and many special alloys including brazing alloys used by industry.

No matter size and position in the field, almost all mills find it advisable to work strictly on day-to-day shipments of silver, with virtually no inventory. Because of this lack of inventory, government silver had to be called on last year.

At the beginning of the year, all of the silver buyers depended to a great extent on purchases from the Bank of Mexico. However, in March, the Mexican source discovered that its silver reserves were badly depleted and quietly dropped off the market. The price immediately jumped 4½¢ per oz.

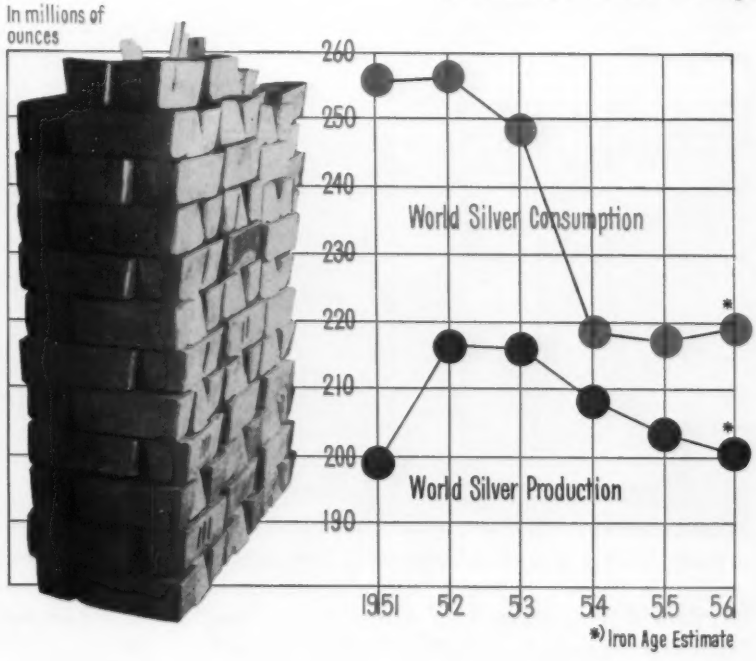
Government Steps In

The Treasury stepped in to take up the slack. The price for government silver was set at 91¢ per troy oz at the New York Assay office, later rose to 92½¢. During the next four months, the trade bought 10.3 million oz of silver from the government, enough to keep up with mill products demand.

Buys Too Much

However valuable the government source proved to be on this

The Wide Silver Gap



occasion, most mills are opposed to present silver policies. Handy & Harman reports that although 10 million oz of silver were there to be sold when needed, the U. S. had bought over 22 million oz which might have gone to industry.

Law To End Laws

On March 14, 1955, during the initial session of the 84th Congress, a bill was introduced into the Senate which provides for repeal of existing silver legislation. Silver consumers and fabricators along with the silver mills favor passage of the bill.

S. 1427, co-sponsored by Senators Green and Pastore, R. I.; Bush and Purtell, Conn.; Kennedy and Saltonstall, Mass.; and Douglas, Ill.; has gone through the Senate committee on banking and currency and is now in the subcommittee of federal reserve. Public hearings were held late last month. No committee recommendation has yet been made. However, Senator Douglas, one of the co-sponsors, is chairman of the subcommittee and there is an excellent chance the report will be favorable. The previous silver legislation may fall into oblivion.

Consensus of industry opinion is that if this happens, the U. S. Treasury with 1 billion oz in reserve will drop completely off the market as a buyer of domestically mined silver.

However, should silver at any time be in short supply, the government would not have the authority to sell silver to industry at a market price. If any was made available, it would have to be at the monetary rate of $1.29 per oz. This possibility, while remote in the short range outlook, must not be ignored.

In this hemisphere there are only two mines of any size which specialize in silver. One is in Mexico and currently off the world market. Most of the silver mined is a by-product mined with other metals—copper, lead and zinc. A serious shutdown in the copper industries mining or refining would immediately be felt in silver.

There would be considerably more fluctuation in the price of silver. Not only would the new law kick out the prop on availability, it would also increase the possibility of speculation. In the current law profits made through speculation are subject to a federal tax of 50 pct. This clause would also go.

Affects Industry

The price structure of silver for the past 10 years indicates a low price of about 75¢ per oz. The ceiling would be the government monetary rate of $1.29. With an area of over 50¢ to fluctuate, there is no doubt that mill products prices would follow suit.

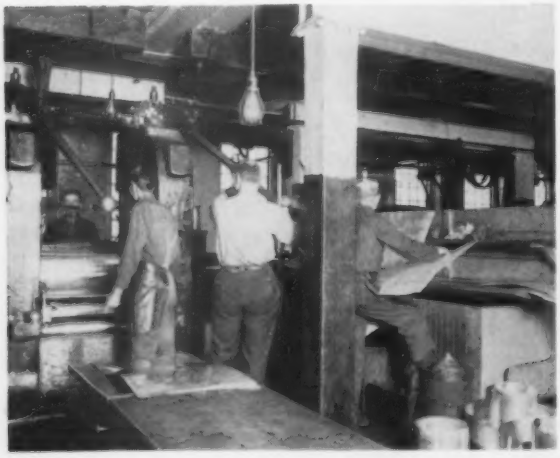
Some of the major industries which would be affected include aircraft, automotive, chemical and food handling, optical industry, refrigeration and air conditioning, appliance, electronics and electrical, surgical instruments and metal machining.

Sources outside of domestically mined silver will be of little help. India, Pakistan, Netherlands, Saudi-Arabia and Australia all have silver. But these reserve stocks are government owned. And all of these countries owe silver to the U. S. under terms of lend-lease agreements. The biggest part of this silver, over 200 million oz, is subject to repayment to the Treasury Dept. by April, 1957. Any silver arriving in this country from these sources will be out of reach of private industry.

Scrap

Silver scrap is also an active commodity. Because of the value of the metal, the turnover is rapid and is a good indication of industry consumption. Currently there is increased activity.

Most of the large silver mills buy sweepings, scrap, filings and solutions; reduce them to concentrated ash, put the results through ball mill and cupel furnace. The end product is assayed and payment is made on the basis of the appraisal. Because the mill runs on a day-to-day basis, this source is important, although relatively minor in the long term supply outlook.

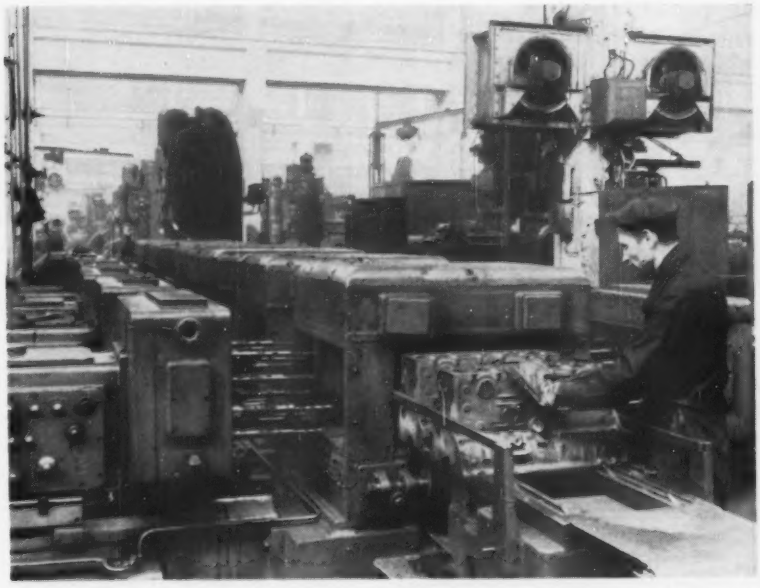


A ROLLING mill gathers no moss. Here is 40 years of progress in Handy & Harman's silver rolling operations. Old timer at left is vintage 1915. Silver slabs were hand fed with pressure regulated by large levers. Newer unit, among the most modern in industry, features automatic control of the entire process including compressed air to pick-up and place silver stock on rolling table. Only one operator at the panel is required.

SPECIAL REPORT

RUSSIA: An American View of Red Industry

Ford engineer studies Russian automation in fast tour of Red plants . . . New factories have modern tools, use advanced assembly and tooling techniques . . . Space is at a premium in crowded plants.



TRANSFER MACHINES similar to those in U. S. auto plants go to work on Russian engine blocks. These automatic lines have been installed in the engine department of the Molotov Automobile Plant. (Sovofoto)

◆ WHAT strides and progress is Russia making in automation and manufacturing techniques?

One U. S. engineer who saw for himself is N. L. Bean, of the Ford Motor Co., who last December made a whirlwind tour of Soviet industry, with particular emphasis on machine tools and automation.

Here, in interview form, are Mr. Bean's reflections and reactions from his tours of seven manufacturing plants, four research and development institutes.

How did you select the plants you wanted to see?

A study of plants in the Soviet Union was made and plants were placed in categories. From these categories we selected plants we thought we would be able to see —considering geographical location, type of equipment, the products they made, etc. There were 11 or 12 plants on our itinerary.

The first morning after our arrival in Russia, we met with the Ministry of Machine Tool Building and Instrumentation. The chief of the Ministry advised us a planned itinerary had been set up. He read the names of the plants and their location and asked if we were satisfied. We said the plan was satisfactory. We then began our plant visits.

The majority of the plants visited built machine tools. We also visited a plant where a digital calculator is built that is capable of handling 8,000 arithmetical processes per second or 250 million arithmetical processes in less than 20 hrs.

Did you see signs of any special effort toward safety?

Wherever they were exposed to grinding chips, the operators wore goggles. In the foundry the workers wore safety shoes, shin guards and goggles similar to those worn by molders in America.

There were no exposed belts.

Touring Soviet Industry

N. L. Bean, Ford Motor Co. engineer, was one of three U. S. engineers who visited USSR industries as part of an exchange program. He was interviewed at the Ford plant by W. G. Patton, Iron Age engineering editor, on his return. The visit included 12 specific plant or institute tours.

There was no exposed gearing in any of the operations we saw. Their safety precautions seemed to be similar to ours. In one foundry we visited they have set up a battery of about 40 inhalators.

In another plant, employing about 12,000 workers, they provide doctor and nurse service that would probably handle 40,000 people. This is because so many employees are women who have families.

They also assign a doctor to the various plant departments, studying health conditions. The effort here is to maintain a high standard of health for the workers. In this particular plant, they have about 100 doctors and 200 nurses, taking care of the needs of the employees and their families.

Editor-in-Chief Tom Campbell analyzes world steel picture in the Feb. 16 issue. Special emphasis is directed to respective rate of growth of Free World and Red orbit.

Did plant maintenance seem to be up to U. S. standards?

The general cleanliness of the plants we visited did not meet the standards of the plants I am accustomed to visit. Lighting did not meet our standards. In some cases, machines were crowded in, which tended to prevent cleanup. A few plants, not so much involved in machine work, were especially clean, well organized and well laid out.

In the manufacturing areas we saw, there is room for improvement in their housekeeping.

How about the social and economic status of engineers?

Social activity of Russian engineers seems to be provided for mostly at the plants. They have what they call, "Recreation Palaces." In most cases, these are new buildings, equipped with swimming pools, gymnasiums and auditoriums where the workers sponsor and put on ballets, operas and stage plays. We had the opportunity to visit these "Recreation Palaces" to see how the workers spend their leisure. It was very impressive.

OVERHEAD CONVEYORS and other modern equipment are in evidence in the assembly shop of the Kresny Proletary Machine Tool plant in Moscow. This picture, dated 1951, eulogized Red production. (Sovofoto)

Another incentive is used very broadly in the Soviet. The engineers are granted individual patents on technical ideas and improvements. For suggesting a special machine or part that contributes to the economic welfare, they are paid quite well. Quite often, their royalties are said to match or exceed their base wages.

Do they seem to have more engineers per worker than we do?

In the plants we visited, the Russians seem to have more engineers per worker than we do. In one plant we visited employing less than 6,000 workers, they had 475 engineers. Of this 475, some 300 are university or college graduates. The balance of these engineers are in some stage of training to become engineers.

The ratio of engineers per worker seemed to be far in excess of ours. This can be attributed, in my opinion, to the fact that they are so definitely concerned with technology that they are going all-out in the engineering field.

What types of cars do they have and what do they cost?

We visited the Gorki plant. They make two types of cars—there is a smaller car, a little smaller than the low priced three in America, called the Victory, and a larger car. The smaller car has 52 hp motor and is a 5 passenger model. It has a tapering back and resembles some of the cars we produced here four or five years ago. They make a larger car, called the ZEM. We used many of these cars on our trips. The cars function very well, ride nicely and appear to be good cars. This car resembles an older model Buick.

We did not see production of the ZES. This car is built in Moscow. It is very similar to a Packard of several years ago. They are planning to produce another car called the Volga. This car will be marketed shortly. We were told the Volga will replace the Victory. The Volga is a little larger than the Victory. It is nice looking. We understand it will have an automatic transmission, the first to be used in Russia. The Volga will weigh less than 3000 lbs.

Would you comment on the manpower required in an auto plant, the number of cars and trucks produced?

A two week visit doesn't make me an authority on Russian manpower. Based on personal observation and the statistics we picked up, which were given to us very freely, the manpower required to produce automotive products is quite a bit higher than it is in the larger plants in this country. There is not as much automated equipment used in the Gorki plant as we employ in our newer plants here. They employ about 45,000 workers in the Gorki plant. Production includes 100 small cars (known as industrial automobile which resembles our jeep), 120 passenger cars and 780 trucks per day. Most popular truck size is 1½ tons and 5 tons. Most trucks produced are bed or open types.

On the subject of cost and wage rates—how can these be related to U. S. standards on a buying power basis?

The average factory worker in Russia makes 800 to 900 rubles per month (at nominal exchange rate of 4 rubles per dollar). Technically skilled workers earn 900 to 3000 rubles per month. Purchasing power is, of course, better here than in Russia.

A single assembly line for mass producing machine tools is not unknown in the U. S. and, of course, was widely used here during the war. Did you see anything like that in the USSR?

In one plant we visited we saw machine tools being produced in mass production. In one particular line, they were producing a machine similar to a Warner & Swasey screw machine or turret lathe. After being machined, the bed is placed on a walking beam, floor-type conveyor. As the machine progresses down the line, ways are scraped and the balance of the machine is completely assembled. This line can produce over 50 machine tools per day. They build about 1000 machines per month.

They are also building a machine comparable to the Cincinnati Milling's follower-type HydroTel. These are vertical spindle machines, having electronic follower attachments. They are building about 30 of these per month.

In this plant they are also building large, horizontal mills, similar to Giddings & Lewis mills.

The plant we visited is just one of many, many machine tool plants in Russia. The Russians are building a large number of machine tools each month.

The ENIMS plant in Russia is an engineering research organization which controls machine tool design. They build and try out most of the prototypes; they also concur on designs to be built in other plants. We spent quite a lot of time here, making two visits. They have a great number of laboratories and test rooms.

While there are many similarities between Russian-built and American-built machines, the machines they are producing now are not copies of American machines. Many features resemble ours; some features are practically identical with ours. We saw hydraulic panels that would be difficult to distinguish from U. S. designs. Of course, we also have many units here that look alike. We also saw many tracer-type lathes, vertical and horizontal, and boring mills being constructed at this plant. We saw the application of electrolytic erosion as a metal-forming process. We made two visits to this ENIMS plant.

Do they seem to make adequate use of jigs and fixtures?

Some of the jigs and fixtures we saw had very sound design elements. They appear to work very satisfactorily. I saw several applications that seemed to me to be unusually good. As an overall, their jigs and fixtures are similar to ours.

Anything in the line of automation?

I understand the Russians have an aluminum piston plant, although we did not see it. They form the pistons in diecasting machines. Pistons are removed automatically and transferred to stabilizing furnaces and held for several hours. The pistons are removed from heat treat automatically. They then go through a long series of automatic opera-

U. S. OBSERVERS noted that Russian plants lacked space, leading to crowded areas such as this tool shop of the Stalingrad Tractor Plant. But equipment is modern and production good in new plants. (Sovofoto)

tions, including inspection, machining, balancing, weight control. This is all fully automatic. This is a completely automated production line.

We saw many applications of automation in Russia. Practically every production machine they are setting up has automation or provision is made for future automation. They are very conscious of automation which seems to be one of the great incentives in the industrial tooling of Russia.

Did you see manufacture of ball and roller bearings?

We saw a bearing line that is completely automatic. The roller bearing forgings are put into hoppers at one end. They are completely machined, quenched, stabilized in a furnace, ground, inspected, assembled and wrapped in oiled paper and sealed without being touched by hand. This line is completely automated. Production is very high—we could not get the rate of production. However, this particular plant, in all lines, produced over 60 million bearings last year.

Using 1950 as a base, this plant raised productivity from 100 to 160 in about 5 years. They attribute the increase to (1) improved machining, (2) automation and (3) "socialistic competition." This is a competitive program with other bearing plants. They challenge each other to a race of productivity on an efficiency basis.

The machines on this line were designed, assembled and built in Moscow at the ENIMS plant.

This plant is listed as the top ball bearing plant in the Soviet Union. Director of this plant is Usibalid Retivoi. We observed two lines of bearing manufacture and assembly. The first was completely automated. Hot rolled forgings are dumped into hoppers at the start of manufacture. The parts proceed into automatic chuckers, through a series of processes, including heat treat, grinding operations, final inspection, assembly and test. They then move to an automatic packaging machine. The only operators are the people who adjust and maintain the production equipment. The automation here would be a credit to any engineering or machine-building group. The unit has only been in operation about 3 months. They are building another line which includes improvements.

Plans call for approximately 30 automatic bearing lines by 1960.

The second line we inspected used standard equipment. In most cases the loading and unloading has been automated. Several different bearings can be run on this line with minor changes in setup. Construction of this plant started in 1932. This was the first ball and roller bearing plant in the Soviet.

They are quite proud of the improvements made in the 5 year plan just ended.

They have three objectives at this plant: (1) automation of all equipment, (2) construction of new lines, (3) wider development of "socialistic competition."

Any evidence of selective assembly, automatic gaging?

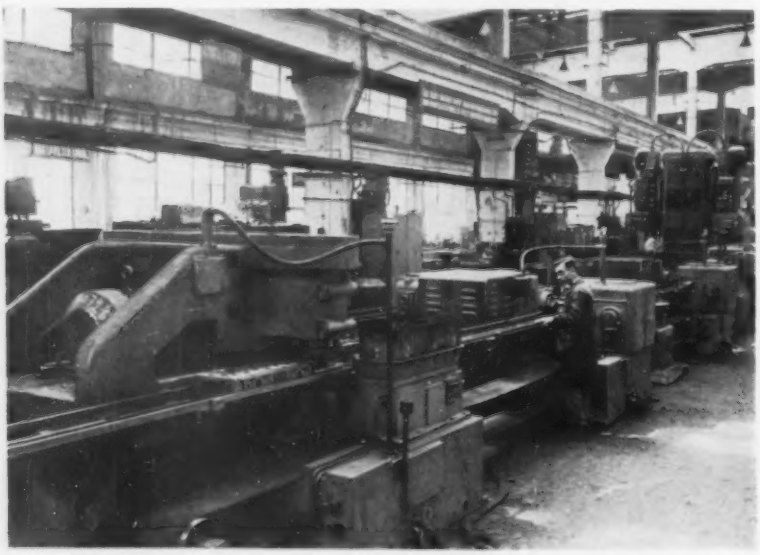
There is a lot of automatic gaging in Russia. Much more is being designed to make possible automatic quality control. All of the inspection on the automatic roller bearing line we saw is automatic. This includes both dimensional and sonic inspection. Inspection on the piston line is fully automatic. The Russians are installing more automatic inspection all of the time.

How about their tool rooms, any unusual equipment?

Tool room equipment is about the same as ours. Sometimes a major portion of the equipment is American equipment. They also had Swiss, German, Polish, and Ukrainian equipment. There were a lot of American machines.

Does manufacturing equipment generally seem equal to that in the U. S.?

Not easy to answer. Some plants were equipped comparable to our plants. In some of these plants, practically all of the machinery is U. S. equipment. Other plants had an intermingling of U. S. and foreign-built equipment. I don't think anyone can match the quality built into our leading types of equipment.



LARGE MILLING machine designed to mill heads of tractor cylinder blocks is being tested at the Orjonikidze machine tool plant in Moscow. It will be part of a new automatic engine line. (Sovofoto)

Atoms:

Army starts research on new nuclear carriers.

Locomotives and cross-country cargo carriers driven by atomic energy are considered good possibilities for future armed forces use, new Army research plans reveal.

To explore the potential value of atomic power in the military movement of men and supplies, the Army will have a detailed study made by the Nuclear Development Corp. of America, White Plains, N. Y.

This firm is working under a new $100,000 contract awarded by the Transportation Research and Development Command, Fort Eustis, Va.

Both land and water operations in atom-propelled equipment are to be explored for military desirability. Some of the items that will be considered are railway engines, harbor and inland waterways craft, and special large land vehicles known as "land trains."

Skip Atomic Jeeps

These latter vehicles, as now visualized, would be powerful enough to pull a number of loaded trailers across rough country. They are seen as especially useful in moving materials to remote outposts in the Arctic, where terrain and high expense limit roadbuilding and the delivery of conventional fuel.

While the chances of using atomic engines in these larger pieces of equipment will be explored thoroughly, this project is not expected to include a study of such plants for Army sedans or jeeps. There appears scant likelihood of propelling cars by nuclear means in the near future.

Nuclear Trains

In a new report to Congress, it is pointed out that "even the smallest" atomic power plant would be too expensive for inclusion in a commercially-priced automobile. Also mentioned is the danger of radiation exposure resulting from wrecks of cars with atom propulsion.

FIRING CENTER for Army's missile laboratory in Florida sees technicians tending complicated control panel. Stepped-up Russian activity in guided missiles is said to have put U. S. development program on a crash basis.

Atomic locomotives probably can be built and run successfully.

Surface ships driven by the atom are feasible now, but they cannot yet be run as cheaply as those with other propulsion means.

Military planes with nuclear engines probably will be built and flown, after problems involving weight and antiradiation shielding are solved.

Space:

President asks $28 million to push satellites.

Scientists and engineers working on this country's plan to shoot artificial moons into the upper atmosphere and beyond are seeking a 300 pct increase in their budget for the project.

President Eisenhower is asking Congress to vote $28 million for further financing of U. S. participation in the 50-nation research activities of the International Geophysical "year" from July 1957 through Dec. 1958. Most of the funds will go to satellite work.

Eventually, the scientists plan to fire some 10 basketball-size baby moons in the hope of getting five or six into the planned orbit.

Travel Path

Defense Dept., which is developing the three-stage rocket that will power the satellites into position, must come up with a projectile that will reach a velocity of about 18,000 miles an hour—nearly three times that ever before achieved in flight. And the rocket must be able to withstand aerodynamic heating during its flight of 1000°F at the nose.

The satellite, a 21½-lb sphere carrying instruments, will be about 20 in. in diameter and make one north-south revolution around the earth every 90 minutes. It will be protected by a disposable cone during ascent. Temperatures within the sphere will range from below 0°F to 300° or 400°F. First satellite should be launched by Sept. 30, 1957.

Originally, the satellite was to fly at about 200 miles from the Earth, but President Eisenhower hints at higher altitudes.

EXPANSION IN INDUSTRY

IBM:

Total West investment will be $50 million

Current expansion program of the International Business Machines Corp. for its West Coast operations will bring total company investment in this district to about $50 million, according to IBM president Thomas J. Watson, Jr.

Project includes construction of a 13-story office building and data processing center in Los Angeles; a 6-story office building in San Francisco; new engineering, manufacturing and education facilities at San Jose; new office building in Santa Monica and data processing centers in Portland, Ore., and Seattle, Wash.

The Los Angeles structure is scheduled to commence construction in mid-1956 and be ready for occupancy in about a year. The San Francisco and Santa Monica buildings are just about ready. The manufacturing facilities at San Jose will go into production this fall. Northwest data processing centers are set for operation in early spring.

According to the company, the fact that the Pacific coast boasts the largest concentration of giant electronic computers in the world is the reason behind the multimillion dollar expenditure.

Thin Rolling Mill

Crucible Steel Co. will spend $2.5 million for a new 50" Sendzimir reversing cluster mill capable of cold rolling stainless steel and titanium strip to thinner gages than the company has ever produced.

The mill will be installed at the company's Midland, Pa., operation. It is expected to be ready for production by 1957.

The new equipment will also feature a new, reputed more efficient, tension measuring device.

Georgia Truck-Trailer

Fruehauf Trailer Co. is planning to build a new 100,000 sq ft truck-trailer manufacturing plant in the Atlanta, Ga., area sometime in 1956. Thus far no specific location has been selected. But company is optimistic and expects to start construction in the early spring. This will be the company's first plant in the Southeast.

Build Own Building

Stan-Steel Corp., division of National Steel Corp., will construct its own plant addition at Terre Haute, Ind., an all-steel building, as part of a $2 million expansion program.

The building will house additional fabricating facilities including new automatic welding equipment. Total manufacturing space will be increased by about 20 pct.

Expansion Briefs

Cummins Engine Co., Inc., Columbus, Ind.; increase engine production 21 pct.

Kaiser Chemical Div., Kaiser Aluminum & Chemical Corp., Oakland, Calif.; new facilities to be added to Moss Landing, Calif. magnesia plant, and at the Columbiana, O. basic refractories plant; to increase production 50 pct; cost $3 million.

Ledkote Products Co., N. Y.; producer of aircraft stampings, assemblies, exhaust systems; expansion of facilities for 10 pct increase in production.

Rockwell Manufacturing Co., Pittsburgh; purchased 106,000 sq ft plant at Statesboro, Ga.; will be used to manufacture meters and valves.

GIANT BEARING for a new draw bridge over the Cuyahoga River in Cleveland takes shape at the Ambridge, Pa., plant of U. S. Steel's American Bridge Div. Two of these 15-ton bearings will carry lifting load of a 255-ft span of the new structure when it is raised to permit river traffic.

Printing electronic resistors at Barry Process Company, Brooklyn, New York, with Denison hydraulic Multipress and special patented head.

Cost-saving idea from ***DENISON***

Triples production of printing electronic resistors

ELECTRONIC circuits are printed three times as fast with the Denison hydraulic Multipress®.

Uniformity of carbon ink deposits holds tolerances within 6% on resistors ranging from 100 ohms to 2 megohms.

Critical timing and pressure control, essential for precise duplication of ink deposits, are easily attained with the Denison split-second time-hold delay and precision controlled pressure on the hydraulic ram.

Exceptionally fast set-up of die platens enables efficient handling of a wide range of work with minimum of setup, for low-cost production of many types of printed electronic circuits.

Have the Denison representative give you more cost-saving details. He can also show you how to save money on jobs like swaging, staking, riveting, deep drawing and assembling. Write us.

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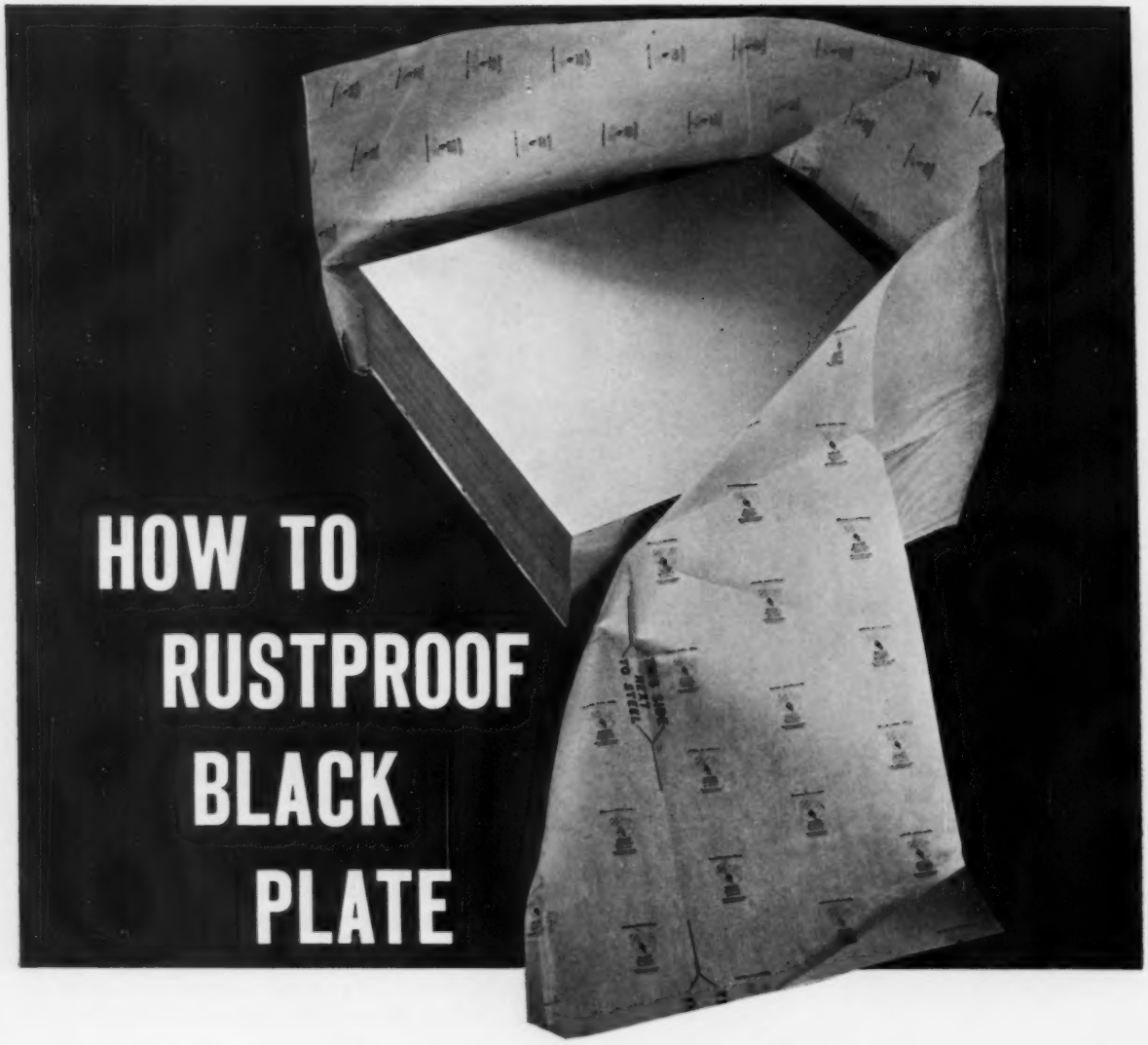

HOW TO RUSTPROOF BLACK PLATE

Rust is a problem anytime, but it's particularly serious with black plate. On this light gauge, dry, uncoated steel, rust can start from a fingerprint. "Sweating" due to sharp temperature changes will cause immediate rusting on surfaces and edges.

Leading mills are now eliminating rust problems by packaging black plate in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Chemical vapors from Ferro-Pak form an invisible film around the steel that prevents rust from getting a start, even when moisture is present.

The new Ferro-Pak sheet above was custom-made by Cromwell's "Paper Engineers" to meet steel mill requirements for shipping black plate and dry sheet steel. It is water-proof, strong, yet highly flexible and easy to handle. Its chemical rust inhibitor is non-toxic . . . compatible with oil . . . stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write **Cromwell Paper Company, 4803 South Whipple St., Chicago 32, Illinois.**

FERRO-PAK® by Cromwell "Paper Engineers"

RUSTPROOFING A FREIGHT CAR. Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.

REPORT TO MANAGEMENT

Can Secretary Humphrey Find $3 Billion?

The Treasury Dept. has through April to find a $3 billion budget surplus. If it can, even those most opposed to tax cuts "at this time" won't be able to prevent a small slash.

The two most heard reasons for opposing tax reductions—national defense and national debt—will scarcely be able to stand up against a thumping surplus of that size. Even the Secretary of the Treasury has indicated he will favor some tax cuts if the surplus is in that neighborhood.

You know where the tax cut will come, of course. Probably any tax relief will come in the form of increased exemptions, with little aid for corporations or in excise tax cuts. In an election year, this is obvious strategy.

But there may be a new reason in the Administration's interest in cutting income taxes. There are signs in certain localities that shorter work weeks and lost overtime are cutting seriously into take-home pay. This is rapidly translated into lost spending power. Feeling may be that cutting taxes at that level will be putting that much more spending power into the economy.

As it stands now, April tax returns will tell the story. Barring an unforeseen falling-off in business, it looks like the Administration will "find" the receipts necessary for a tax slice recommendation. Furthermore, Congress would probably make the cut on its own anyway.

The Consumer Credit Problem

You're being exposed to a lot of stories about tough bill collections, repossessions of installment financed appliances and other implications that consumer credit has been extended too far.

Indications are that these are pretty much localized and out of perspective. There's no getting away from the fact that consumer credit is high, about $35 billion outstanding. But there's no sign that Congress is about to apply the brakes to any great extent.

President Eisenhower recently suggested that Congress "examine" the problem, but deliberately avoided being too emphatic about the request, although he would like some legislation empowering the Administration to regulate consumer credit.

Congress is not likely to authorize anything like the old Regulation W, which stipulated a minimum down payment and limited time to pay. It will avoid anything that could put the brakes on the booming economy, or aggravate any tender spots like auto sales.

Home buying has already been made easier. The 30-year mortgage was reinstated when new housing starts started to dip following the Administration's first "credit curbs."

Strategy on both sides of the political fence is to have as much money in circulation in November as possible. And apparently both business and consumer groups want it that way too.

It Isn't Just Talk About Missiles

There's no doubt but that we are in a crash program on the intercontinental guided missile. It's been apparent for some time, but is just getting public attention.

Development of the 1500-mile missile now has the status that the atom bomb once had. The country to have the first successful one will have the have-not nations at a complete disadvantage in cold war give-and-take.

You can expect stepped up programs all along the line. The $1.3 billion asked for in the President's budget indicated that. New emphasis will increase the pressure.

INDUSTRIAL BRIEFS

Turn on the Lights . . . One of the first large steam turbine-generators with liquid-cooled stator conductors in the history of the electrical industry has been constructed by General Electric Company's Large Steam Turbine-Generator plant for The Cleveland Electric Illuminating Co.'s station at Eastlake, O. The unit consists of a tandem-compound turbine rated at 240,000 kw and its connected generator rated capable of producing 260,000 kva.

Swiss Imports . . . The Carl Hirschmann Co., Inc., Manhasset, N. Y., has been appointed U. S. agents for F. Blaesi & Co., Soleure, Switzerland. The Blaesi firm manufactures a copy grinding machine which permits the simultaneous grinding of two duplicate lathe tools, form tools, profile gages, or production parts in one operation.

Safe Repairs . . . Furnace Repair Crew at the Graham Plant, Vanadium Corp. of America, Graham Station, W. Va., has clocked more than 1,000 days without a lost-time injury.

Tooling The Market . . . Vulcan Crucible Steel Co., a division of H. K. Porter Co., Inc., tool steel producer, has appointed Grammer, Dempsey & Hudson, Newark, N. J., and Passaic County Steel Service, Inc., Paterson, N. J., distributors in the N. Y. metropolitan and N. J. areas.

Watch Those Standards . . . The Steel Joist Institute, whose membership comprises the major companies producing open web steel joists, has arranged to conduct periodic unscheduled inpections of its members' plants to determine conformity of manufactured products to standards and specifications established by the Institute.

Selling To Buckeyes . . . Techneering Sales, Inc., Dayton, O., has been formed to take over the southwest Ohio sales activities of Jack Dustman & Associates. Jack Dustman & Associates will now engage solely in Indiana sales from its Indianapolis headquarters.

Gets a Lift . . . F. J. Dunleavy, Yale & Towne Mfg. Co., was elected 1956 president of Lift Truck and Portable Elevator Manufacturers Assn. at the recent Association meeting, in New York City.

Air Pressure . . . Joy Manufacturing Co., Pittsburgh, has initialed a new facility at Buffalo to be known as its Turbo-Dynamics Div. for production of compressors, turbines and other air and gas-handling devices.

Stretching Operations . . . Stillman Rubber Co., Culver City, Calif., has acquired Extruded Products Co., Fullerton, Calif., producers of extruded rubber products. The new acquisition will be operated as the Extruded Products Div. and will extend Stillman operations into the field of extruded rubber and silicone tubing.

Easy Promotion . . . The National Assn. of Foremen is now the National Management Assn. following a vote of all 350 affiliated managements clubs. The association claims it has broadened its original concept of being for foremen only and now is made up of men from all levels of management.

Out of the Garden . . . Motch & Merryweather Machinery Co., Cleveland, has sold its Triple M. Products Div., manufacturers of multi-purpose garden tools, to Hahn, Inc., Evansville, Ind.

A Lot of Paper . . . American scientific organizations and industries last year purchased 64.8 pct more Government research reports through the Office of Technical Services, U. S. Dept. of Commerce, than they did in 1954. This large increase in sales by OTS indicates increased awareness of these sources of technical information and their value in the nation's research and development programs, according to John C. Green, OTS Director. Total sales for 1955 amounted to almost a quarter of a million dollars, reports cost from 10 cents to several dollars a copy.

Good Work . . . Giles J. Strickroth, Martin Co. electronics engineer, has been named by the Institute of the Aeronautical Sciences to receive the 1955 Lawrence Sperry Award for development of the guidance system for the USAF TM-61 Matador tactical Missile.

Coal vs. Railroads . . . The National Coal Assn., in behalf of member bituminous coal producers, petitioned the Interstate Commerce Commission for a separate hearing in connection with the railroads' request for seven pct general freight rate increase. NCA urged the ICC to put upon railroads the "burden of proof to show that the proposed increase on traffic as a whole and upon coal traffic is just . . . and lawful."

Bolting Up . . . Bethlehem Steel Co. has received contract for the steel framework of what will be the world's largest rivetless skyscraper. The structure will contain more than 1 million sq. ft of net rentable space and rise to 38 stories at 666 Fifth Ave., New York. All 13,000 tons of steel in the building will be held together by a high-tensile bolting method.

FACTS

about

NEW DEPARTURE

BALL BEARINGS

Another "NEW DEPARTURE"! Pocket-size calculator calculated to cut costs!

Prices at your finger tips for over 100,000 different bearings! This "new departure" in the bearing industry lists basic engineering data, simplifies ball bearing selection, helps engineers figure design costs.

Instant information is available on New Departure's complete line of standard industrial bearings . . . and most important, the calculator cuts costs for buyers by spotlighting savings with low-cost, high-volume *standardized* ball bearings.

Ask your New Departure sales office about it . . . it's another New Departure "first" in ball bearings!

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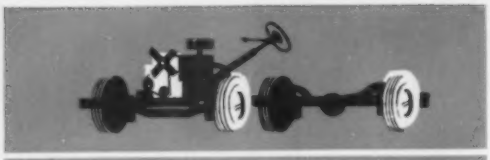

AUTOMOTIVE ASSEMBLY LINE

Will Brougham Top Prestige Field?

Cadillac's answer to Continental pushes futuristic engineering ideas . . . "Memory" seat, four headlamps, stainless steel top are few of car's features . . . Slated for August production—By T. L. Carry.

◆ CADILLAC Eldorado Brougham is another of General Motors' dream cars that will soon become a reality.

The car is scheduled to go into limited production in August of this year and probably it will be the first of the 1957 cars.

The Brougham, like its competitor, the Continental Mark II, is specifically aimed at the upper crust of the prestige car market. But this is the only aspect of similarity between the two automobiles.

The Continental's main selling point is its perfection of tried and true practices in the industry.

On the other hand, the philosophy behind the production of the Brougham is to create a modern American motor car which takes advantage of some highly futuristic engineering developments.

Lots of Stainless . . . Adding to the car's modern appearance is a more extensive use of stainless steel. The roof of the Brougham will be entirely stainless with a brushed chrome finish. In addition, rear fender skirts, extending for practically one-third of the car's length, will also be stainless steel.

The use of four headlights instead of two on the Brougham has led to some speculation that they might not be legal. It is almost a certainty, however, that by the time the Brougham goes into production any legal difficulties will be overcome.

The outboard lights on the car will be used for city driving and the inboard units will be used for the high beam.

Cadillac claims several advantages to separate low and high beam driving lights. The GM division points out that lights on today's cars have reflectors that are not aimed specifically for either a low or high beam.

Better Light Control . . . When a motorist switches from one beam to the other, he changes the light pattern by changing the position of the filament.

Separate lights for each beam, Cadillac says, allow the reflectors in each of the lights to be set so that they give a specific light pattern. The light will also be better controlled because the filament in each unit will be fixed.

When driving on the high beam in the Brougham, both the low and high beam lights will be on. This is to compensate for the dead spot which is evident when cars equipped with ordinary lights are switched to the high beam.

All four lights burning at once will not, according to Cadillac, prove a safety hazard. Because all the lights are specifically designed and aimed to do a particular job, the effect will be less blinding than it would be if regular lights were used.

CADILLAC'S Eldorado Brougham will graduate from dream car to production car as GM seeks to top Ford's Continental in prestige market.

New Door Idea . . . Another feature of the Brougham is the absence of a center post. The doors will swing open on the front and rear of the car. Once the transmission is placed in the drive position, the doors automatically lock and they cannot be opened until the car is stopped and taken out of the drive position.

Also, if you get out of the car and forget to close the windows, they automatically close when you put the key in the door to lock the car.

Memory Seat . . . Perhaps the most outstanding talking point

Plating development works big changes in metal finishing

◆ **Companies plating products with chromium are switching to an advanced process . . .**

◆ **Benefits achieved include fast production, increases in capacity of existing equipment, savings in power, better finishing . . .**

Things changed abruptly a few short years ago for companies finishing products with chromium when the Unichrome SRHS Chromium Plating Solution was introduced. It gave users a more efficient, more easily controlled and faster process . . . resulting in better finishing and substantial savings. Here are some recent reports from the field:

EFFICIENCY UP . . . POWER BILLS DOWN

A 60% reduction in power costs was achieved by SRHS when it was installed by one of the country's leading manufacturers of electrical appliances. A 50% slash in power need was made in another plant.

SAME EQUIPMENT . . . 66% MORE CAPACITY

Existing equipment gained 66% additional capacity when SRHS replaced the ordinary solution in the plant of a prominent automotive manufacturer. The change avoided need for costly overtime or extra equipment to increase output.

And on top of such cost reductions, there are also better results with SRHS Solutions. Users get fewer rejects, better color, better coverage of intricate parts, more uniform plates.

This is just one of many Unichrome developments in processes, equipment and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.

UNICHROME Trade Mark

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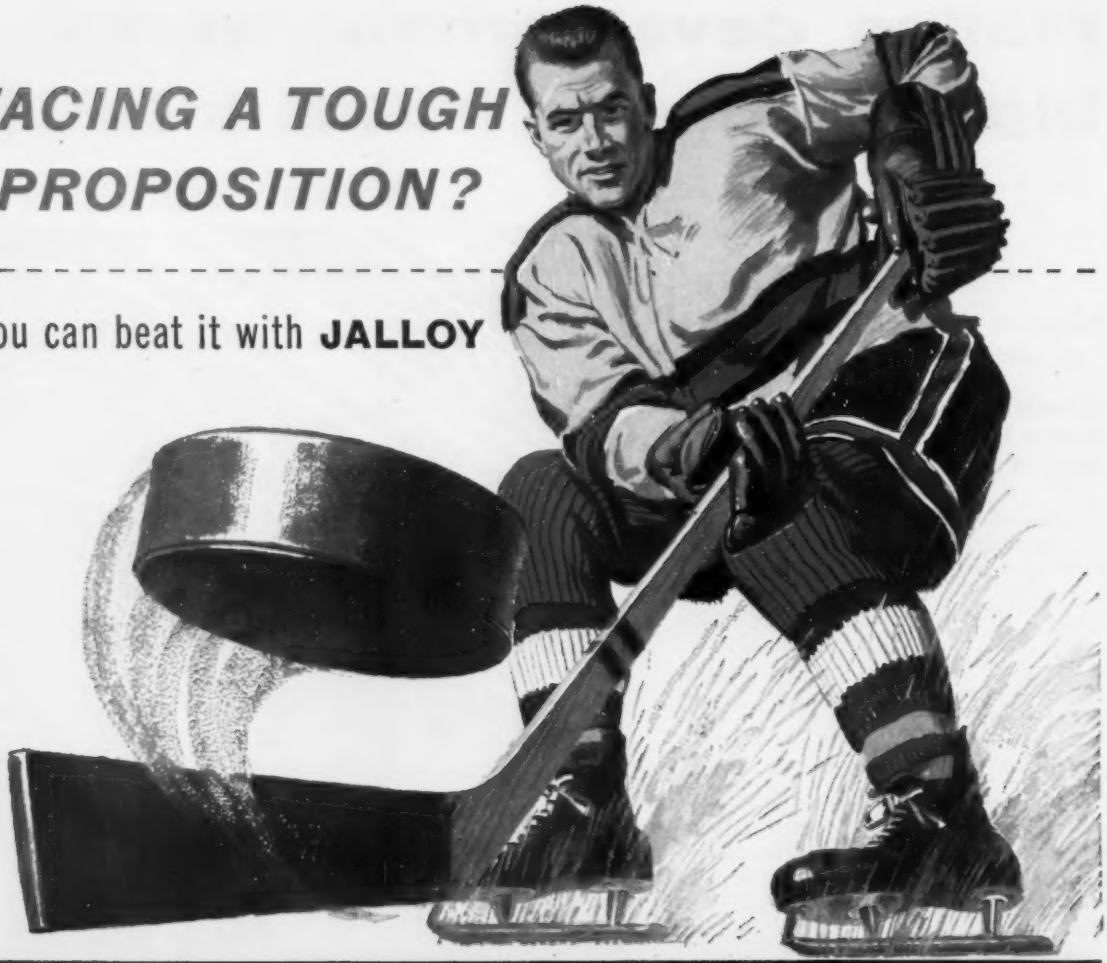
FACING A TOUGH PROPOSITION?

you can beat it with **JALLOY**



J&L JALLOY HEAT-TREATED PLATE BEATS WEAR DUE TO ABRASION

J&L Jalloy Heat-Treated Plate is the general purpose steel that is heat treated to provide longer wear on applications where impact and abrasive conditions are severe.

In comparison with other abrasion-resistant steels as well as mild steels, it gives optimum results when heat treated to a Brinell hardness of 340 and up. Jalloy permits savings in steel costs, maintenance, and repair. Furthermore, it is easily welded. Jalloy is available in three grades to meet various service requirements.

J&L STEEL

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STEEL CORPORATION — *Pittsburgh*

Complete data concerning CHEMICAL COMPOSITION . . . HEAT TREATMENT . . . WELDABILITY . . . PHYSICAL PROPERTIES . . . will be mailed to you promptly. Write today.

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Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Feb. 4, 1956	147,384	27,768
Jan. 28, 1956	141,692	27,530
Feb. 5, 1955	170,846	19,294
Jan. 29, 1955	167,190	23,278

*Estimated. Source: *Ward's Reports*

about the Brougham is the front seat, which Cadillac calls a "memory seat." The production model will have a front seat that is all one piece, unlike the original dream car which featured individual bucket seats that pivoted.

Persons of different heights who drive the car can adjust the seat to their own particular needs and, by pressing a button, can record the position on the seat's "memory."

When a short person gets behind the wheel after a tall driver has been operating the vehicle, he need only press a button and the seat automatically adjusts itself to the position previously selected.

When the rear door of the Brougham is opened, the seat automatically moves forward and down to allow easier entrance. Likewise, when the front door is opened, the seat moves backward and down.

New Frame . . . New methods of construction, including an all new frame design, will be used in the Brougham. All outside dimensions of the car have been reduced but the amount of room inside the car remains the same. Outside dimensions are: length, 216.4 in.; height, 55.5 in.; width, 80 in.; wheelbase, 126 in. Cost, $8500.

Original plans for production call for about 1000 units per year. However, the schedule is flexible enough so that it can be revised upwards if Cadillac desires.

Stainless Use Climbs

In addition to such specialty uses as in the Brougham, stainless steel is doing well on bread-and-butter lines.

During 1955, the automotive industry used more stainless than ever before, an estimated 140,000 tons or 20 pct of total stainless shipments, according to the American Iron and Steel Institute.

About 98 pct of the automotive total was in sheet and strip, primarily for use in trim. Its corrosion resistance contributes to its extensive use for hub caps and stone shields as well as window trim and hardware, lamp assemblies, grilles and other parts.

Records:

Did 1955 sales records detract from 1956?

Now it's official. Figures just released by the Automobile Manufacturers Assn. show that 9,169,144 cars, trucks and buses were sold by U. S. plants in 1955.

The figure is more than 1 million over the old record set in 1950.

The only other time that factory sales went over the 8 million mark was in 1950. In that year 8,003,056 vehicles were sold.

Broken down, the AMA says 7,920,133 cars and 1,249,011 trucks and buses were sold last year.

AUTOMOTIVE NEWS

It's a lead pipe cinch that the industry is not going to reach that total again this year.

Production schedules have been steadily cut since the first of January. Original estimates were that the industry planned to make over 2 million vehicles in the first quarter. Now, it is unofficially estimated that schedules for this period have been cut to about 1,900,000 units.

What's causing the slowdown? There are two main reasons for it.

First of all, whether the industry likes to admit it or not, the record sales last year did borrow from the future.

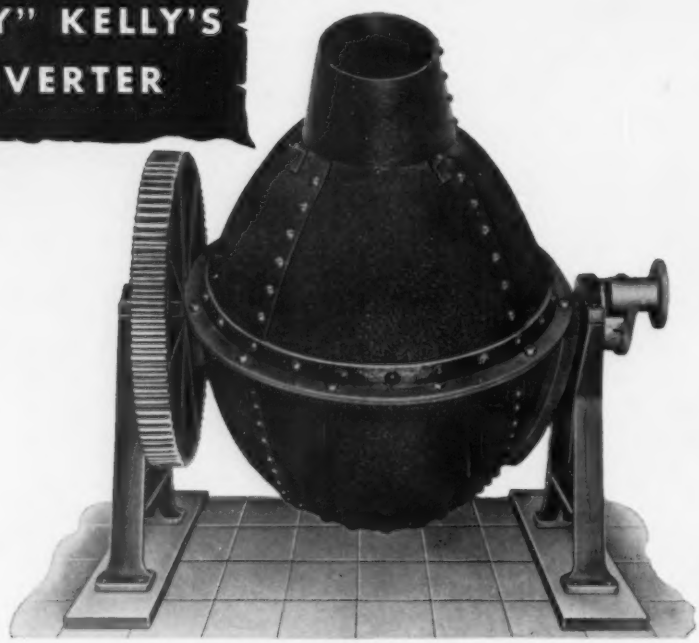
Secondly, the hearings in Washington involving dealers and manufacturers have had more than a subtle influence on auto executives. Because they are in the limelight and probably will stay there for quite a while, producers are not ramming cars down dealers' throats.

THE BULL OF THE WOODS — **By J. R. Williams**

THANKS EVER SO MUCH, BUT I'M WATCHIN' IT! I GOT A EYE ON THAT CHALK MARK, BUT THANKS ANYWAY!
HE WAS DEAD TO TH' WORLD, BUT IT KIND OF PROVES YOU'RE NO HERO TO TH' GUY YOU SAVE!
MAN IS MORE KIND THAN ORNERY! DOZENS HAVE SAVED HIS NECK, BUT HE'S STILL SARCASTIC AND THEY STILL KEEP SAVIN' HIM!
2/8
J.R.WILLIAMS
THE HABITUAL
© 1956 by NEA Service, Inc. T.M. Reg. U.S. Pat. Off.

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

"CRAZY" KELLY'S CONVERTER



In 1847 William Kelly started experimenting to find a cheaper and more rapid way of refining pig iron by blowing cold air into molten iron. Friends thought his idea was mad, and after several experiments had failed Kelly was sent to Dr. Huggins to be treated as a mental patient. The doctor, however, discovered that Kelly's idea was as sound as his mind and advised Kelly to continue his experiments. Shortly after 1851 Kelly was able to make a malleable iron or steel, depending on the amount of carbon in the metal by his process. Kelly's first converter was put into use at The Cambria Works in Johnstown, Pennsylvania.

In 1854, Henry Bessemer experimented with the same process, unaware of Kelly's work, and he received an English patent in 1855. Later, when he applied for and got an American patent, Kelly heard of this and filed a claim of priority of invention. The Government, in 1857, reversed their original grant to Bessemer and upheld Kelly's claim. Kelly finally sold out his patent to the Bessemer group, whereby came the name Bessemer Converter.

There's no mistaking who originated the first dead-burned dolomite, it was The J. E. Baker Company. Since its beginning BAKER'S MAGDOLITE has been constantly improved until today it is always 5 ways better: Composition, Preparation, Strength, Economy and Quality. The next time you order dolomite be sure to specify BAKER'S MAGDOLITE. You'll find BAKER'S MAGDOLITE will increase a more uniform ingot yield with less defective production material.

7-55

ANOTHER FAMOUS FIRST

JEBCO PRODUCTS SINCE 1889

BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

Why Red Plant Aid Talk Looks Fishy

Moscow promises include aluminum mill for India . . . U. S. experts can't see it . . . They point to capital goods pinch at home, say Russians can't help others . . . What's the catch?—By G. H. Baker.

◆ COMMUNISTS have their fingers crossed when they promise the world's underdeveloped countries "gifts" of machinery, dams, power plants, and even complete factories.

Our State Dept. says bluntly the Reds are not in a position to deliver.

Example: Moscow is wooing India's political leaders with promises of an integrated aluminum mill. U. S. experts say Reds would build such a mill only if they intended to grab off nearly all the output for themselves.

Ike's foreign experts say Russia cannot and will not deliver on these big industrial promises for two principal reasons:

(1) Most of the promised industrial goods simply are not available in the U.S.S.R.;

(2) The few nonmilitary goods and services that are available in the Soviet are badly needed in the Red domestic economy.

See Reds Short . . . Intelligence reports seeping out of Russia via the Scandinavian countries cite the continuing shortages of consumer goods and how these shortages are stirring up discontent among the masses.

Lack of first-class housing in the big cities, lack of consumer durables, and the ever-present shortages of warm clothing are causing a lot of grumbling among Russian workers.

Nations that channel more than half of their gross national output into armament inevitably have civil discontent on their hands. This fact is causing the Red leaders a lot of grief in 1956.

Pentagon Asks Patience . . . Pentagon supply bosses hotly deny the new charges of procurement inefficiency fired by a group of House Democrats.

The men in charge of the Defense Department's $20 billion a year buying programs claim they're merging their scattered purchasing offices as fast as possible. Be patient, they ask.

The House group (the Democrats on a House subcommittee on government operations; Republican members have issed a blistering denial) blames Secretary of Defense Wilson for "failure" to beat the Army, Navy, and Air Force into line on the problem of centralized buying.

They claim Mr. Wilson is either "unwilling or unable" to take the necessary steps to bring on integration of military purchasing.

Nonsense, He Says . . . Secretary Wilson says this is all political nonsense. He says the Democrats are not aware of many improvements in the procurement program which have been put into effect.

Procurement of food, medical supplies, clothing, oil, and ground transportation has already been centralized, he points out, and other centralized - procurement moves are in the offing.

Ailing Area Aid . . . Prolonged federal loan aid for companies in depressed industrial regions is an ineffectual way to create an improved business climate in those areas, says the U. S. Chamber of Commerce.

Hazy reasoning, the organization charges in a new report, characterizes proposals for federal assistance in the form of loans for new plant construction to bring communities out of the economic doldrums. Basic job to be done, essentially at the local level, is to insure that underlying conditions are sound enough to attract and hold good employers.

What the employer wants, in part, says the report, are healthy employer-employee relations, an efficient state and local government, and adequate schools for employees' families.

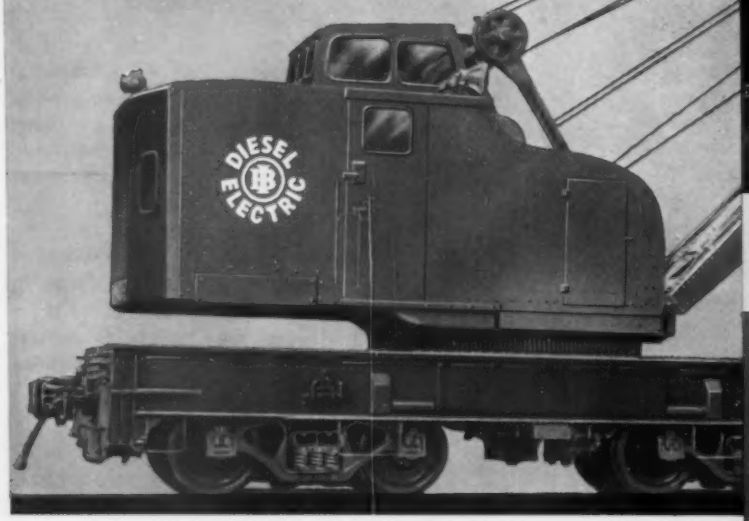
AEC Cleans House

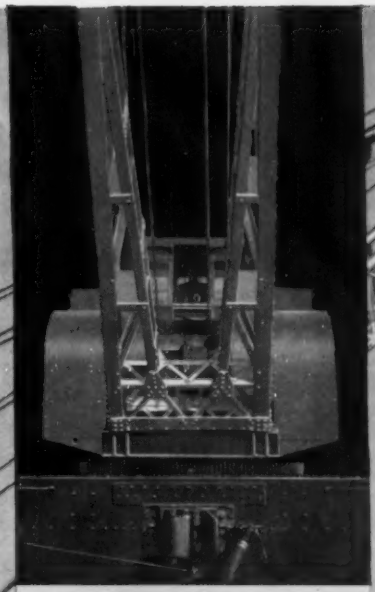
▪ The U. S. Atomic Energy Commission says proudly that it set some kind of record in fiscal 1955 by burning records faster than it accumulated them. AEC says it dumped 94,414 cu ft of paper during the 12-month period, which is 105 pct of the volume generated during the year.

▪ First time it's ever happened at the AEC, and one of the few times it's ever occurred in government. Traditional government custom is never to throw anything out. Instead, the departments and agencies ask Congress each year for more file cabinets and more file clerks. With all reports in triplicate, paper piles grow.

FASTER and SAFER crane operation

with BROWNHOIST patented monitor type cab and clear vision boom

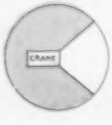




This view from below shows you the great visibility right through the middle of the Clear Vision Boom.

Windows on all sides of the raised Monitor Type Cab of a Brownhoist Locomotive Crane give the operator a full view of the area in which he is working, and the open type Clear Vision Boom lets him look right down at the work itself. This complete 360° visibility—to the sides, to the rear, and forward into the car—allows the operator to work more rapidly, without unnecessary crane swinging, and also increases safety by eliminating blind spots. The patented Monitor Type Cab has a door on each side, and all doors and windows can be opened for ventilation. A soundproof partition separates the operator from the engine and controls are placed within convenient reach of his adjustable seat. These factors assure ease of operation of the Brownhoist Locomotive Crane, and Brownhoist engineering assures maximum performance. Anti-friction bearings are used throughout including machinery side frames. The boom hoist is worm driven for smooth, safe operation. Dynamatic clutches disconnect all upperworks when travelling . . . give sure, positive control. High strength alloy steels bulwark the machine for heavy service. Throughout, Brownhoist Locomotive Cranes are designed and built for high capacity production. For further information write today for Catalog No. 548.

Approximate visibility from ordinary cab.



Approximate visibility from side-operated cab.

360° visibility from I. B. patented Monitor Type Cab.

Your operator can see exactly what he's working with in the car in front of him. Greater safety is the result.

188

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Washington, Cleveland, Chicago, San Francisco, Montreal • AGENCIES: Detroit, Birmingham, Houston

SUBSIDIARY OF Penn-Texas

BROWNHOIST

Bids:

Ask design quotes on trailership terminal.

Architectural and engineering companies are invited by the U. S. Maritime Administration to offer proposals for the design of marine terminals to serve new roll-on-roll-off ships.

Invitations call for the writing of contracts for this work on a cost-plus-fixed-fee basis. Interested companies are asked to offer detailed analyses, including schematic plans, of facilities that would be required to handle the trailer-hauling vessels.

Maritime Administration intends to learn from these studies the needs for:

1. A specialized terminal built primarily to accommodate several types of trailerships.
2. An all-purpose terminal designed to handle conventional as well as one or more of the new-type ships.
3. Modification of either or both of the first two facilities to include any necessary apparatus for lift-on or conveyor ship types.

Full consideration is to be given in the studies to ship berth facilities, truck loading areas, railroad and truck traffic circulation, and transit or freight sheds.

Push Lake Ships

The government's ship construction subsidy program should be extended to include Great Lakes ore vessels and other cargo carriers. Congress hears the move is necessary to meet the threat of Canadian and other foreign competition.

Rep. A. D. Baumhart, Jr., R., O., is sponsoring a bill to bring Great Lakes ships under the subsidy program, now restricted to ocean-going vessels.

Under the bill, Great Lakes ships would be turned over to the government as they become obsolete, and the shipowners, in exchange, would get a "credit" toward purchase of a new ship. The old ship would be put into a government reserve fleet for emergency use.

Credit allowance for retired ships would take into account the "cost advantage" in construction of similar foreign vessels.

Rep. Baumhart is a member of the House Merchant Marine Committee which will consider his bill. He says several House members from the Great Lakes region will push the bill, and Sen. Charles E. Potter, R., Mich., is introducing a similar measure in the Senate.

Cut Tungsten Imports

Development of domestic sources of tungsten and sharply reduced requirements are resulting in a reduction in a government contract to buy South African tungsten.

General Services Administration at the beginning of the Korean War contracted with a South African firm to purchase 120,000 short ton units of the metal at a cost of $7 million. Contract now has been cut back by $2,429,000. The contract was originally scheduled to run through March 31, 1958.

Roads:

Users will pay for federal highway program.

Congress has finally decided who's going to pay for the nation's badly-needed new highways. It's the users of the new roads who'll foot the bills.

Republican leaders have abandoned their earlier stand in favor of special bond issues to finance the new roads. They have joined with the Democrats in supporting some sizeable increases in the federal taxes on gasoline, oil, tires, tubes, and other automotive products involved in highway usage.

President Eisenhower now says he agrees with the congressional leaders that this is the best method for covering the high costs of the program.

Bill Asks Millions

By present estimates, these costs add up to $51 billion for the next 13 years, with the federal share of the expense amounting to about $36.5 billion. Nearly $25 billion of the federal funds would go for the 40,000-mile interstate system, for which the states would be assessed only 10 pct of the costs.

These estimates are based on the new highway bill offered by Rep. Fallon, D., Md. It provides that funds to back primary, secondary, and urban road construction would amount to $725 million in fiscal 1957, $750 million in fiscal 1958, and $775 million in fiscal 1959.

What It Means

These latter expenses would be shared 50-50 by federal and state governments. At the discretion of Congress, the total could be raised an additional $25 million a year through fiscal 1969.

To meet the expense of a road-building plan as large as that outlined in the Fallon bill, more than $10 billion in additional use-tax revenues will be required.

Nucleus of the current plan for raising federal funds for new and improved highways is a one-cent boost in the federal gasoline tax, now at 2¢ per gallon. Other increases would be prescribed on diesel fuel, lubricating oil, tires, tubes, and retread material.

Guess We Stop Missile Work?

▪ Ever since U. S. military chiefs learned that Russia has a guided missile capable of being piloted to this continent, ordnance experts have been searching for an effective neutralizer. They've now perfected one, but aren't ready to talk about it yet. Tip-off is dropped by Lt. Gen. Gavid, Army research boss. The intercontinental ballistic missile is no longer "the ultimate weapon" (meaning, there is no defense against it), he says, but he clams up at this point. Details may not be disclosed for many months.

"...now what about the service?"

IRON PRODUCTS
"Swede" *pig iron*
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Plates (sheared)
A.W. Dynaloy (high strength steel)
Hot rolled sheets
Hot rolled strip
Cold rolled sheets
Cold rolled strip
ROLLED STEEL
FLOOR PLATE
A.W. ALGRIP *abrasive*
A.W. SUPER DIAMOND *pattern*
COAL CHEMICALS
A.W. CUT NAILS
Standard & Hardened
MINE PRODUCTS
Iron ore concentrates
Iron powder
Crushed stone
Sand
COKE
Foundry, industrial & metallurgical
PENCO METAL PRODUCTS DIVISION
Steel cabinets, lockers & shelving

We strive to give the utmost service to our customers. That, like Alan Wood quality control, is a basic advantage in buying A.W. Cold Rolled Sheet and Strip.

When problems arise as to the correct temper or finish to use, call on our metallurgists for assistance. They've helped our customers with hundreds of production problems and are always on call. It's part of our normal service.

We're a completely integrated mill and have close departmental contact. We keep close tabs on your order, in the mill and in the office. We make it a personal issue to see that your requirements are met.

In short—your order gets the individual attention required for dependable service. For your cold rolled sheet and strip requirements, look to Alan Wood. Additional information available on request.

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ALAN WOOD STEEL COMPANY

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AW-47

Coast's 100 pct Steel Rate Not Enough

Some manufacturers have to cut production despite 100 plus rate of West's mills . . . New capacity scheduled for most facilities . . . Lockheed is moving Missiles Div. to San Francisco Bay area—By *R. R. Kay.*

◆ FARWEST steelmakers are pushing their mills for all they're worth. Operating rate since the first of the year: consistently over 100 pct and as high as 104.5.

At the same time, many steel users here are cutting production. They just can't get all the steel they want. So they're needling the steelmakers for more and more of the stuff. And the mill operating pace keeps galloping along.

Modernization Does It . . . Bethlehem Pacific Coast Steel Corp. has tacked on 50,000 ingot tons per year to its Los Angeles mill's rated capacity. How? More efficient use of its up-to-date equipment and a continuing modernization program.

During most of 1955, its Los Angeles works operated at over 100 pct—and up to 116 pct. With Bethlehem's other West Coast mills at San Francisco and Seattle, company's total ingot capacity is now 950,000 tons.

Colorado Fuel and Iron Corp. hired Kaiser Engineers Div. of Henry J. Kaiser Co., Oakland, Calif., to handle general engineering on a new 250-ton open hearth and to study necessary plant structural changes.

Columbia-Geneva Div. of U. S. Steel is increasing capacity 381,000 tons at the Geneva Works, Provo, Utah. It's jacking up the 10 open hearths to 300 tons each and adding other equipment.

Kaiser Steel Corp. is going full blast, and working like mad to squeeze the most out of its Fontana (Calif.) Works. Company expects 1956 production to be biggest ever.

Moving Missiles . . . As predicted in this column, Nov. 24, 1955, Lockheed Aircraft Corp., Burbank, Calif., is moving its Missiles Systems Div. to Sunnyvale, in the San Francisco Bay Area. During the Pentagon's dispersal talk the company bought 275 acres for a guided missiles plant. The division now has 3000 on the payroll. Employment will skyrocket when the new plant is ready. It's said Lockheed has several highly secret missiles projects under way.

Scarce Spring Makers . . . "Shortage of skilled precision spring makers in the Western and Pacific Coast States has reached such alarming proportions that our national defense effort is seriously imperiled." So warns Elvin C. Rhodes, president, Pacific Spring Manufacturers Assn. The industry here is plenty worried about it — feels the supply of skilled spring makers in the area will vanish. What to do about it?

More Flying . . . Businessmen need a high-speed, long-range executive transport certificated in the airline category. That's the word from Lear, Inc., Santa Monica, Calif. Company supplied firms with $4 million worth of its "Learstar" executive planes last year—has new orders for $2 million more.

ATOMIC ENERGY reactor built by Atomics International, division of North American Aviation, will supply power to Southern California Edison. This will be first non-military reactor to supply private utility power.

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Mr. Harry J. Blum, President
Armstrong-Blum Mfg. Company
5700 West Bloomingdale Avenue
Chicago 39, Ill.

Dear Mr. Blum:

The Quality of our cutting is an important part of our service, and we are constantly on the lookout for better and more efficient methods.

In 1950 we purchased a Marvel #18 Hack Saw for cutting structural shapes and bars. The clean, accurate and burr-free cuts are so satisfactory that we have since installed a second similar machine.

Very truly yours,

J. W. White, Jr.
Treasurer

JWW: b

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"for cutting structural shapes and bars"...

"clean and accurate with burr-free ends"...

..... another example of the efficient cutting off of structurals with a MARVEL No. 18 Hydraulic Hack Saw.

If your shop is required to cut structurals, bar stock or beams—clean, accurate and burr-free – then you should consider a MARVEL Hydraulic Hack Saw (No. 18 Capacity 18" x 18": and No. 24 Capacity 24" x 24"). These giant saws are truly designed and built with the ruggedness and rigidity necessary to withstand the rough treatment of sawing big work, even though the work is in the "toughest of the tough" alloys.

There is a MARVEL field engineer near you capable of intelligently discussing your cut-off work. Send for Catalog No. C-55 and the name and address of your nearest MARVEL field engineer.

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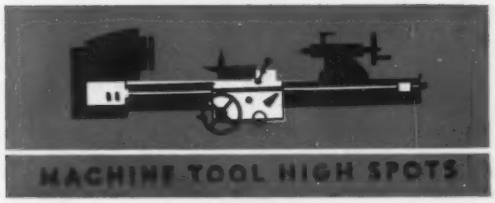


Why Diamond Tools Draw Spotlight

Chicago meeting will discuss natural and man-made stones . . . New techniques for synthetic production stir interest . . . Users ask if added supply will mean more applications—By *E. J. Egan, Jr.*

◆ SPOTLIGHT will be turned on diamond tools at the American Society of Tool Engineers' Convention and Exposition to be held in Chicago's International Amphitheatre, March 19 through 23.

A 13-paper diamond symposium, sponsored jointly by the ASTE and Armour Research Foundation, will cover the production, selection and utilization of both natural and man-made stones.

Background for all the emphasis on this subject is the fact that in past times of national defense emergency, industrial diamonds always zoomed to the top of the critical list. Until recently, the natural stones from South Africa were all that anyone could think of counting on.

What Users Ask . . . This discovery raises two big questions in the minds of industrial diamond users: (1) Can the synthetic product be produced in sufficient sizes and quantities to compete costwise with the real thing? (2) Will the new diamond-making technique eventually increase the supply to the extent that new industrial uses will be developed and become popular?

To answer such questions, symposium speakers from Johannesburg, Antwerp and Amsterdam will alternate with experts from Terre Haute, Paterson and Detroit. Among the topics to be discussed: Diamond structure, selection and specific applications.

Set Close Watch . . . Special precautions will be taken to safeguard a $1 million display of man-made diamonds at the Tool Show itself. The same exhibit will house a workshop in which several diamond cutters will make tools on equipment shipped in from South Africa and Europe.

Other industrial conferences during the five-day convention will accent new developments in somewhat more familiar production equipment and processes. These papers and research reports will cover such subjects as ceramic cutting tools, rental vs. purchase of machine tools, solving carbide die problems, advantages of plastic tooling, designing to meet competition, and how automation and close tolerances affect jig and fixture design.

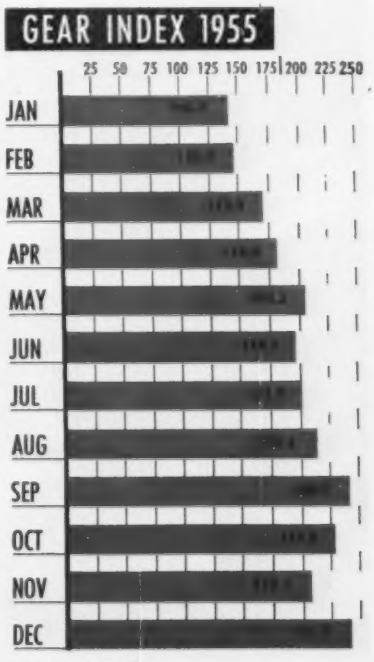
What Price Profits . . . Harry Faust, retiring president of Chicago's Tool & Die Institute, told fellow members at an annual meeting that they are living in an era of "profitless prosperity." He said this was true despite booming business in 1955 and predictions for more of the same this year.

Even with this "favorable atmosphere," Faust said many T&DI members have been finding it hard to maintain adequate profit margins. He put the responsibility on two factors: The abnormally high wage rates paid in Chicago, compared to the rest of the country; and the ever mounting costs of fringe benefits to workers.

Automation Outlook . . . We'll see a lot of assembly automation in the next five years, according to Ralph E. Cross, vice president of The Cross Co., Detroit builders of automated machine tools. He says the equipment his firm built last year to assemble automobile engines is "just the beginning."

Cross notes that capital spending plans designed to boost primary metal output to record levels will brighten machine tool industry prospects "way into 1958."

Gear Index Up . . . Index of business volume in the gearing industry rose to 245.5 in December, 1955, a 16.7 pct gain over the November level. Index for all of last year is computed to be 199.2. This is about 31.1 pct over 1954.



Base: 1947-49 = 100
Source: American Gear Manufacturers Assn.

The steel that could take anything but a bath

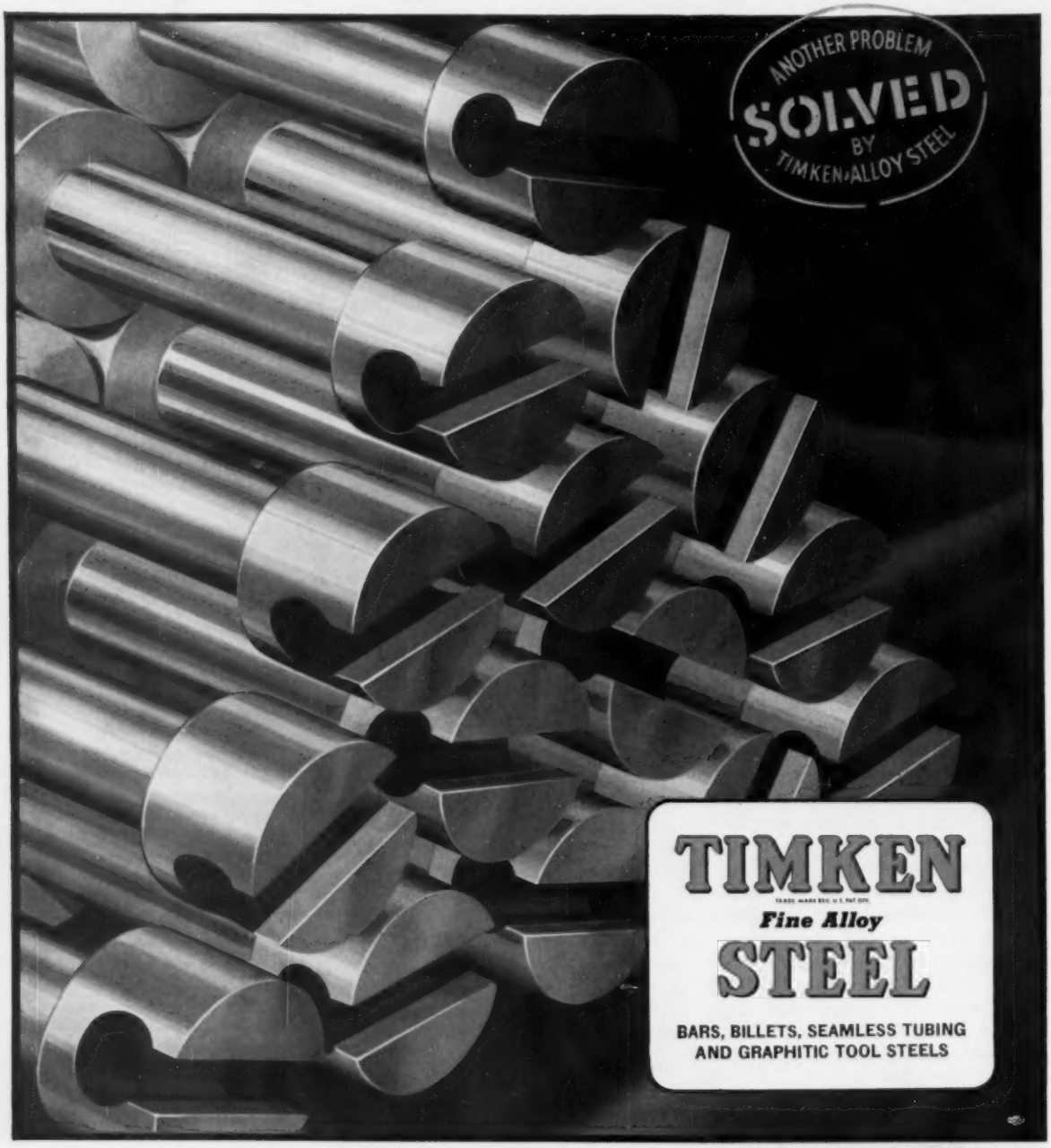
IN steel mills and warehouses, a roller leveler straightens wide sheets and heavy plates between powerful steel rolls and shoots them out flat and level.

As you can imagine, the stress on the rolls is tremendous. To make them strong enough and tough enough, one roll manufacturer was using an alloy steel, 52100. Then to make the rolls *hard* enough, they were heated to a high temperature and quenched in a liquid bath. But the severe quench was causing many of the rolls to warp.

The roll maker brought his problem to metallurgists of the Timken Company. "Could rolls be made from 52100 steel that wouldn't distort in quenching?" Their considered answer: Yes—if the steel were uniform, from lot to lot, in analysis and hardenability.

So the roll maker changed to 52100 steel made by the Timken Company. They found the steel *was* uniform—lot to lot . . . heat to heat . . . year in, year out. The roll maker was able to standardize his heat-treating practice. Since the change to Timken steel, distortion has been practically eliminated.

Our files bulge with scores of problems that have been "Solved—by Timken Alloy Steel". Can we help solve a steel problem for you? Write: The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Tapered Roller Bearings, Alloy Steels and Seamless Tubing, Removable Rock Bits.



COPR. 1956 THE TIMKEN ROLLER BEARING COMPANY

The Iron Age SALUTES

William R. Heath **He spent 24 years on the road, designing and selling blower installations. This rugged background has paid off in seasoned judgment and a capacity to work well with people.**

How do you recognize a competent man? At Buffalo Forge, they made Bill Heath executive vice president last year. The announcement touched on projects he had sparked. He designed fans for the Lincoln and Boston tunnels. His work paved the way for aircraft wind tunnels. He has been in on blower installations for many of the big power plants.

But Mr. Heath has something else that old hands will spot quickly although they may not be able to identify the quality clearly. He has been around. He has been out working on blower installations all over the continent, living with customer problems in Detroit, Georgia, Illinois and Canada. When you get a man with engineering ability and a sales flair and you give him 24 years of field work, you get a solid mixture that inspires confidence outside the company and within. That's what Buffalo Forge has in Bill Heath—a good man, tried and proven.

Mr. Heath is a competent veteran. He learned his work the long, hard way. But there's nothing crusty in his approach to jobs. He marshals facts carefully. He welcomes the opinions of all concerned. He makes his decision in a few minutes or a few weeks, on the basis of seasoned judgment and full consideration.

Mr. Heath came to Buffalo Forge Co. in 1922 with a background of engineering study at Cornell. In those days, engineers were plentiful, but in a little over two years he had been made assistant chief engineer. This led to a long period of travel, designing and selling blower equipment for utilities and many others. In 1948, he became chief engineer of the company. In 1951, he became director of manufacturing and a director of the company. In 1953 he became vice president, manufacturing. Last year, he was elected executive vice president.

Mr. Heath is a big man, measuring 6 ft 2 in. He has a son studying for his doctor's degree at the University of Wisconsin. He grows roses, likes outdoor cooking, still spends too much time on the road to have any really consuming hobbies.

How Correct Lubrication recovered it—saved $56,000 in one year!

It happened often . . . and every time it did, production in this steel plant stopped—repairs had to be made. In a year's time they literally lost a fortune on this "merchant" in maintenance alone!

The culprit was a "hot merchant mill"—a continuous rolling mill that forms angle iron, I-beams, round stock, sheets and various other shapes from hot steel billets. The rollers in this mill operate under heavy loads and pressures. As a result, roller bearings don't last too long even under ideal conditions. But this mill wore out *25* bearings a week—excessive for *any* type of operation. And each bearing cost $86 to replace—a total of over $110,000 annually!

A Socony Mobil engineer, called in to work on this problem, soon found the trouble. The wrong type of bearing grease was being used, cooling water was carrying dirt into the bearings, and the bearings themselves were incorrectly designed. He made recommendations that corrected these conditions. Immediately, bearing replacements were cut in half. The company is now saving $56,000 a year!

★ ★ ★

The expert services furnished this plant were part of a Socony Mobil program of Correct Lubrication. You can get a similar program for your own plant—to help improve production, cut costs. Why accept anything less?

SOCONY MOBIL *Correct Lubrication*

FIRST STEP IN CUTTING COSTS

SOCONY MOBIL OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

The Iron Age INTRODUCES

CLARENCE B. RANDALL, retiring chairman of board and chief executive officer, Inland Steel Co., Chicago.

A. G. Patterson, former president of Electric Controller and Manufacturing Co., Cleveland, has been elected president of its new parent company, **Square D,** Milwaukee; **John D. Leitch** was elected vice president and chief engineer of Square D; **Alvin C. Dyer** was elected vice president and general manager of Electric Controller and Manufacturing Div., Cleveland. This corrects an erroneous version of these changes as carried in Jan. 19th issue.

John Lawrence, elected president and chief executive officer, **Joy Mfg. Co.,** Pittsburgh, Pa.; **W. L. Wearly,** appointed executive vice president; **H. C. Nyquist,** elected vice president, general sales.

William R. Toeplitz, appointed president, **Bound Brook Oil-Less Bearing Co.,** Bound Brook, N. J.; **Harold O. Johnson,** appointed chairman of board and treasurer; **Samuel S. Connor,** appointed vice president; **H. E. Thornton,** appointed chief engineer.

Bernard R. Molitor, appointed sales representative, Pittsburgh district, Watson-Stillman Fittings Div., **H. K. Porter Co., Inc.,** Roselle, N. J.

Henry G. Dacey, appointed general sales manager, **Cleveland Cap Screw Co.,** Cleveland; **Thomas A. Fribley,** appointed assistant general sales manager.

Samuel Wessel, elected vice president, **The Hyman-Michaels Co.,** Chicago.

J. D. Neuman, assistant vice president and director, purchases, **Sharon Steel Corp.,** Sharon, Pa.; **F. W. Bennett,** appointed vice president.

J. Harvey Johnston, appointed vice president, **The National Roll & Foundry Co.,** Avonmore, Pa.; **Roy A. Gezelius,** named assistant vice president, **General Steel Castings Corp.** and **The National Roll & Foundry Co.**

C. D. King, appointed assistant to the executive vice president, operations, **U. S. Steel Corp.,** Pittsburgh.

R. C. Rudolph, named assistant to president, **Universal-Cyclops Steel Corp.,** Bridgeville, Pa.

Fred E. Solymos, appointed vice president and general manager, **Colonial Metals Co.,** Columbia, Pa.

Vincent T. Kepler, appointed supervisor, application development section, Carmet Div., **Allegheny Ludlum Steel Corp.,** Ferndale, Mich.

Fred E. Rau, appointed assistant hoist sales manager, **The Yale & Towne Mfg. Co.,** Philadelphia; **Richard H. Marsh,** appointed worksaver and warehouse sales manager.

JOSEPH L. BLOCK, president of Inland Steel Co., becomes chief executive officer.

P. D. BLOCK, JR., appointed senior vice president, Inland Steel Co., Chicago.

PAUL W. POLK, elected executive vice president, The Sheffield Corp., Dayton, O.

MEMO
FROM THE
PRESIDENT

Phil S. Coffer, President of C & H Supply Co., manufacturers of Metal-Cals

In our competitive economy, manufacturers and distributors constantly strive to improve their products and services. One of the newest improvements in product identification is Metal-Cals. They come in any size or shape with a variety of colors, and can be die cut to any design. America's leading industries are using Metal-Cals... the colorful, original, anodized and dyed, etched .003" aluminum foil. Metal-Cals are faster to apply than decals or name plates and do not require screws, pins, rivets or other fastening devices—they reduce labor and material cost in most applications. Metal-Cals "stick to the job" of trademarking, providing clear, sharp diagrams or serial numbering for operating or maintenance instructions for your products. We would appreciate it if you would send in this coupon so that you may examine Metal-Cals and see why they are industry's most modern and economical method of product identification.

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PAT. PENDING

Louis H. Derrer, appointed vice president, **Algoma Steel Corp., Ltd.,** Sault Ste. Marie, Ontario; **Reg Armstrong,** appointed assistant general manager, steel works; **Douglas Joyce,** appointed general superintendent; **C. C. Benton,** appointed assistant to executive vice president; **W. P. Dowhaniuk,** appointed superintendent, blast furnaces; **B. W. H. Marsden,** appointed assistant superintendent, blast furnaces.

John D. Benedito, appointed general sales manager, Plastics Div., **Bakelite Co.,** New York.

M. F. Glaser, appointed branch manager, **Westinghouse Electric Corp.,** Youngstown, O.

Sidney J. Barber, named manager, Metal Working Products Dept., **E. F. Houghton & Co.,** Philadelphia; **Claude G. Wall,** appointed supervisor, Metal Working Research.

Ralph L. Dunlevy, appointed plant manager, **McLouth Steel Corp.,** Detroit.

A. P. Rider, appointed assistant district sales manager, **Republic Steel Corp.,** Los Angeles; **George W. Kropp,** appointed superintendent, Niles Strip Tin Div., Warren District.

Richard A. Geuder, appointed general sales manager, **Reliance Electric & Engineering Co.,** Cleveland; **Earl C. Barnes,** appointed assistant chief engineer.

James T. McClain, appointed manager, sales, southern region, Industrial Fasteners Div., **Oliver Iron and Steel Corp.,** Birmingham, Ala.

Louis Zinader, appointed district manager, New York, **Luria Brothers & Co., Inc.; Julian Grombacher,** appointed scrap trader, Chicago office.

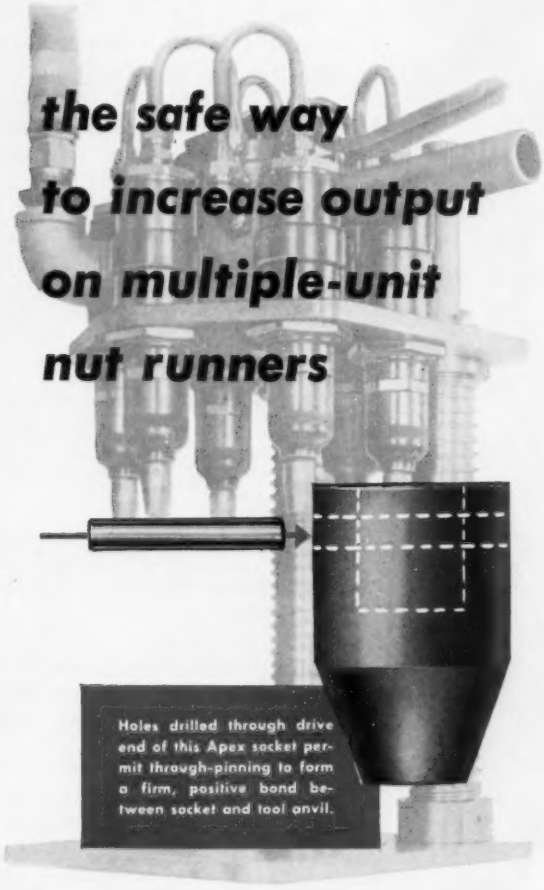
GORDON H. CHAMBERS, named chairman of board, Foote Mineral Co., Philadelphia, Pa.

L. G. BLISS, elected president, Foote Mineral Co., Philadelphia, Pa.

GEORGE PERRAULT, JR., appointed vice president, E. W. Bliss Co., Canton, O.

ADIN A. BROWN, elected director and vice president, Mining Operations, American Smelting and Refining Co., New York.

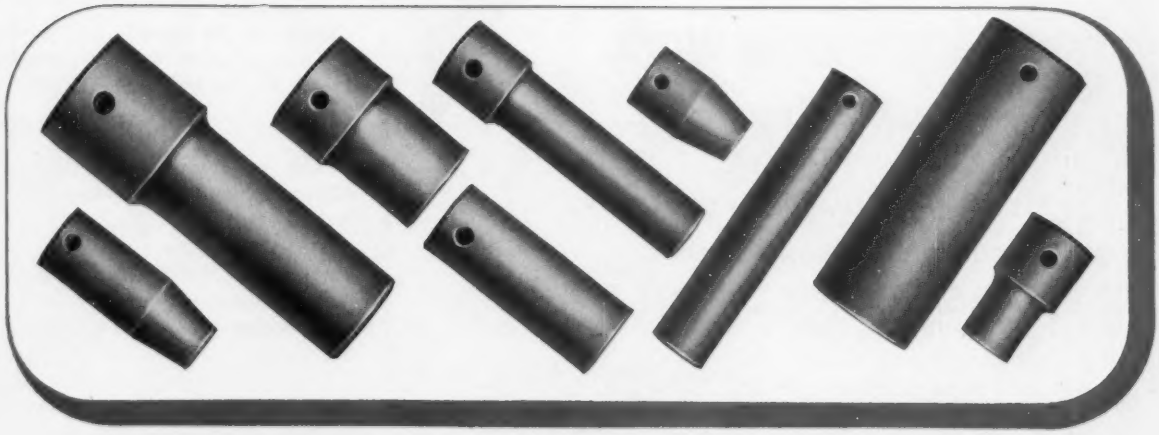
APEX "pin-through" SOCKETS


the safe way
to increase output
on multiple-unit
nut runners
Holes drilled through drive end of this Apex socket permit through-pinning to form a firm, positive bond between socket and tool anvil.

You can make certain you're getting the most work from your multiple-unit nut runners by using Apex "pin-through" sockets. Designed specifically for such use, these Apex impact sockets eliminate the troublesome, often dangerous, dropping off of sockets while tool is in operation.

Apex offers a full range of impact sockets for use on multiple-unit nut runners. Three basic types—straight, tapered and shoulder . . . standard or magnetic . . . square drives from 3/8" to 1". Available for use with hex nuts, cap screws, sheet metal screws . . . also offered in deep bolt-clearance type.

For your multiple-unit nut runners . . . and for all your nut running requirements, Apex alone offers the most complete line of impact sockets, extensions, adapters and universal wrenches. Catalog 29-R lists more than 5,000 stock types and sizes. Write today, on your company letterhead please, for your copy.



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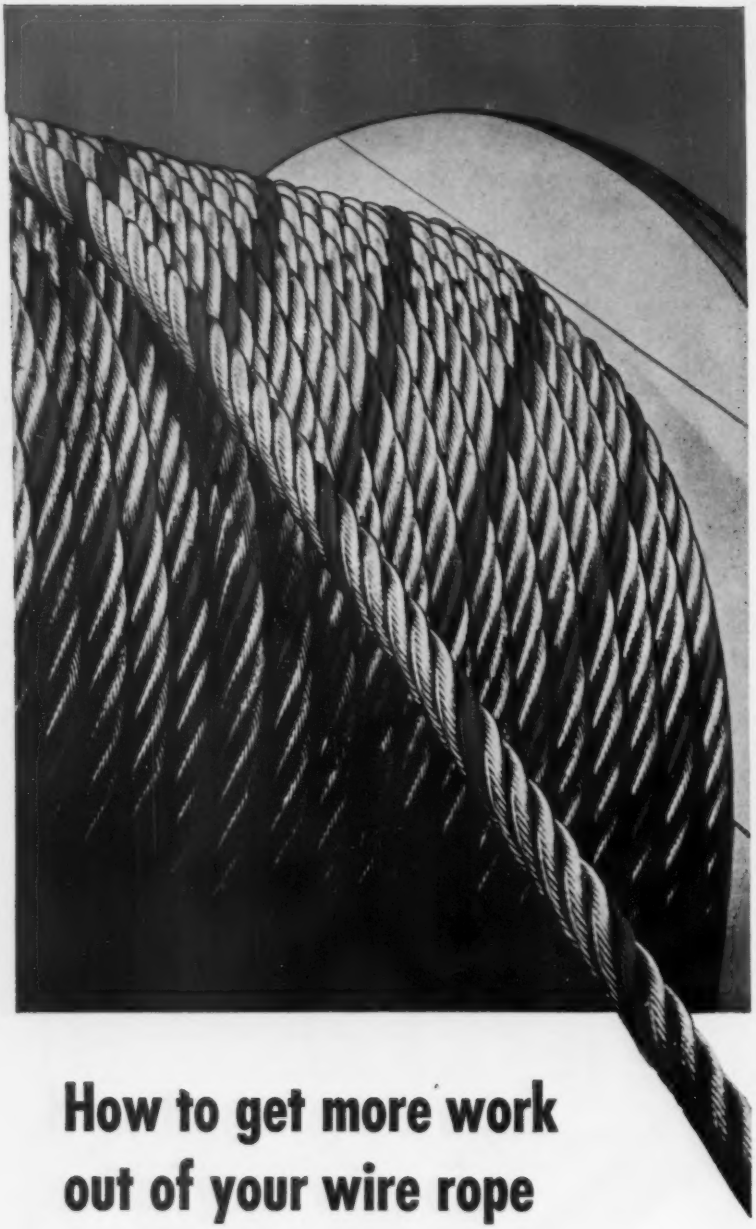

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PERSONNEL

William W. Henderson, appointed assistant general sales manager, **R. Hoe & Co., Inc.,** New York.

Clyde C. Logue, named manager, Light Metals Div., **Thompson Products, Inc.,** Cleveland.

Donald K. Wright, named manager, by-products sales, **American Smelting & Refining Co.,** New York.

L. L. Duncan, appointed sales manager, Unit Heater & Mill Supply Div., **D. J. Murray Mfg. Co.,** Wausau, Wis.

Charles R. Delorme and **Carl F. Johnson,** appointed sales engineers, Detroit territory, **Colonial Broach & Machine Co.,** Detroit.

Edward J. Reagan, appointed manager, stainless steel sales, **Universal-Cyclops Steel Corp.,** Bridgeport, Conn.

John McKinlay, appointed assistant sales manager, Packing Div., **Raybestos - Manhattan, Inc.,** Passaic, N. J.

George F. Long, appointed assistant manager, sales, reinforcing bars, **Inland Steel Co.,** Chicago.

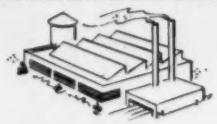
Gene W. Richmond, appointed to Chicago sales force, **International Packings Corp.,** Bristol, N. H.

John L. Cotsworth, appointed manager, sales, **Northeastern Steel Corp.,** Bridgeport, Conn.

Charles V. Nicholson, appointed general manager, product sales, **F. J. Stokes Machine Co.,** Philadelphia.

John E. Duesing, appointed sales manager, Mechanical Div., **Hagan Corp.,** Pittsburgh.

H. Gene Miller, appointed abrasive engineer, Minnesota and Wisconsin, **Bay State Abrasive Products Co.,** Westboro, Mass.



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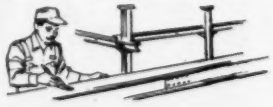
Industrial leaders all over the world have used Rust-Oleum to stop and prevent rust for over thirty years. Rust-Oleum can do the same for your tanks, stacks, pipes, machinery, metal sash, wire fences, girders, etc.

RUST-OLEUM IS EXCLUSIVE

Rust-Oleum uses a specially-processed fish oil vehicle that penetrates rust to bare metal, dries right, and is free from objectionable odor. Accept no substitutes. Buy—and specify Rust-Oleum. You'll be happy that you did. There is only one Rust-Oleum—it is distinctive as your own fingerprint.



APPLY DIRECTLY OVER RUSTED SURFACES

Just scrape and wirebrush to remove rust scale and loose rust—then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust, usually eliminating costly surface preparations. Then—follow-up with your desired Rust-Oleum finish color.

MANY COLORS, INCLUDING ALUMINUM AND WHITE

You beautify as you protect, because Rust-Oleum finish coatings are available in practically all colors, including aluminum and white. They use the same basic rust-inhibiting vehicle as Rust-Oleum 769 Damp-Proof Red Primer and so provide double protection.

GREATER COVERAGE—EASY TO USE

Rust-Oleum is so easy to apply by brush or spray that one man can often do the work of two. Because of Rust-Oleum's easy-flowing qualities, an average of 30% more coverage is usually received—depending upon the type and porosity of the surface.

PRACTICAL ANSWER TO YOUR RUST-PRODUCING CONDITIONS

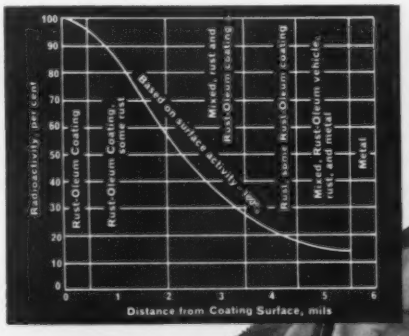
Rust-Oleum dries to a firm, decorative finish that resists salt water, heat, fumes, sun, steam, humidity, and weathering. Whatever your rust problem—you'll find Rust-Oleum the modern, practical way to stop rust.

Facts

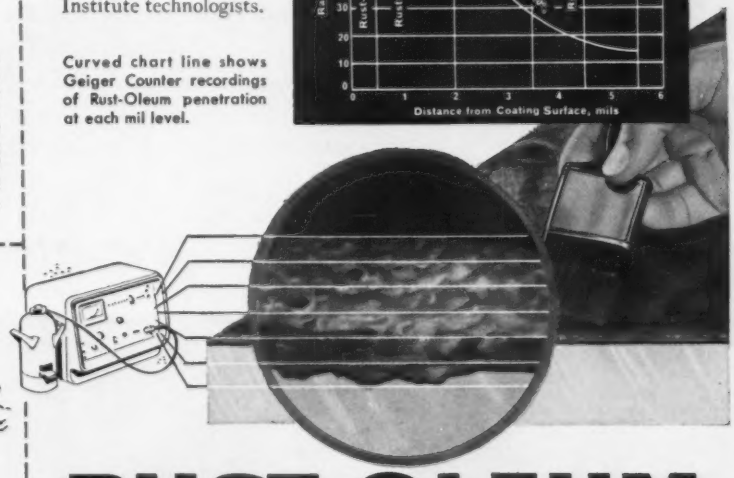
prove the economy of

RUST-OLEUM®

Geiger Counter traces Rust-Oleum penetration through rust to bare metal. The results of radioactive research prove that Rust-Oleum penetrates rust to bare metal. Rust-Oleum's *specially-processed* fish oil vehicle was radioactivated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Geiger Counters then traced Rust-Oleum's *specially-processed* fish oil vehicle through the rust to bare metal. This penetration enables Rust-Oleum to be applied directly over sound rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your business letterhead for your thirty-page report, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



Curved chart line shows Geiger Counter recordings of Rust-Oleum penetration at each mil level.



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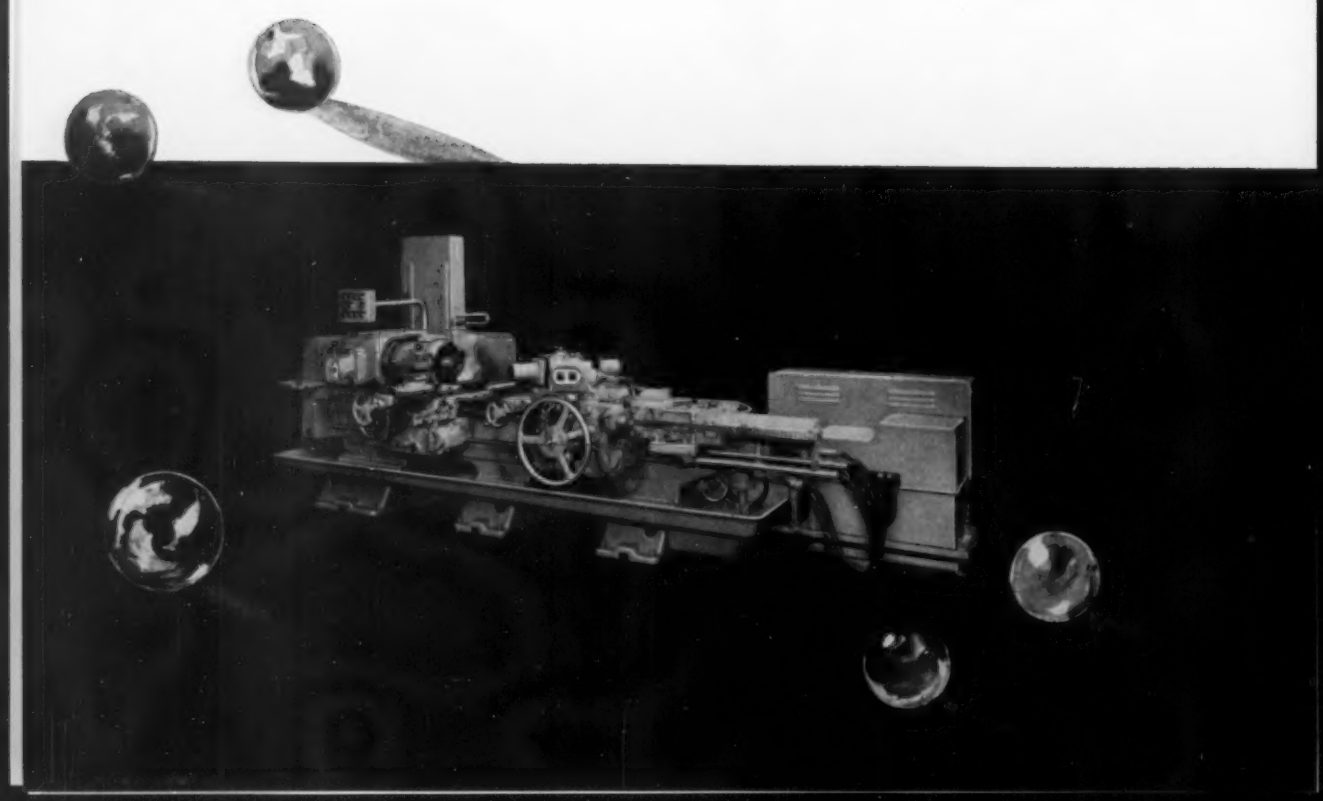
CHILD'S PLAY



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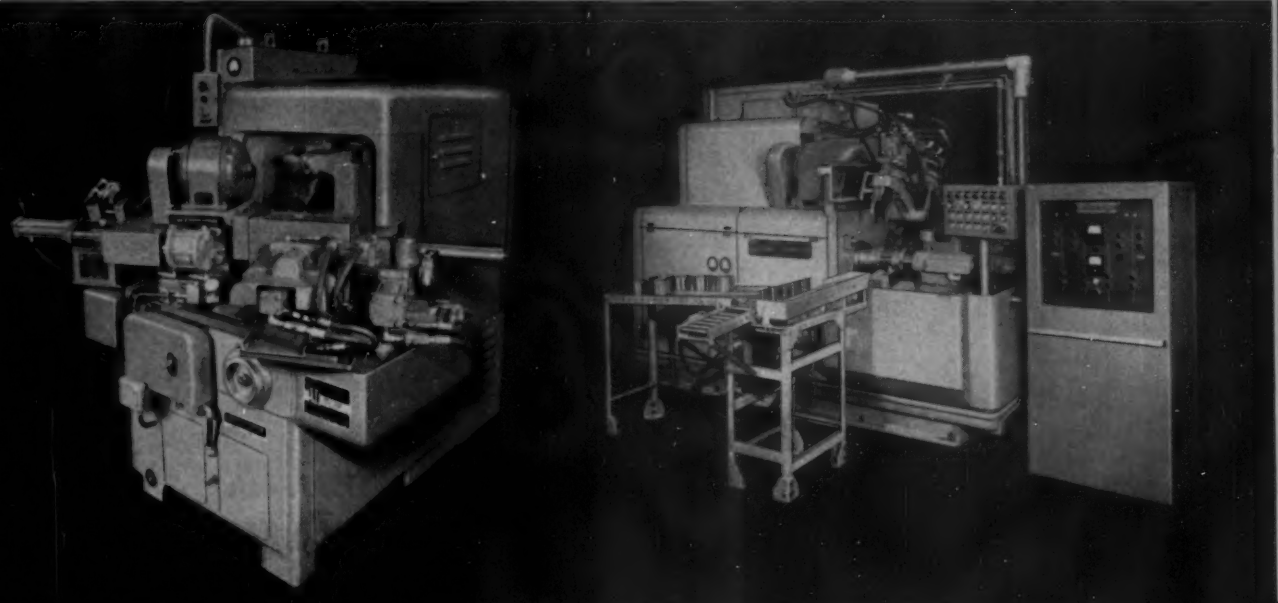

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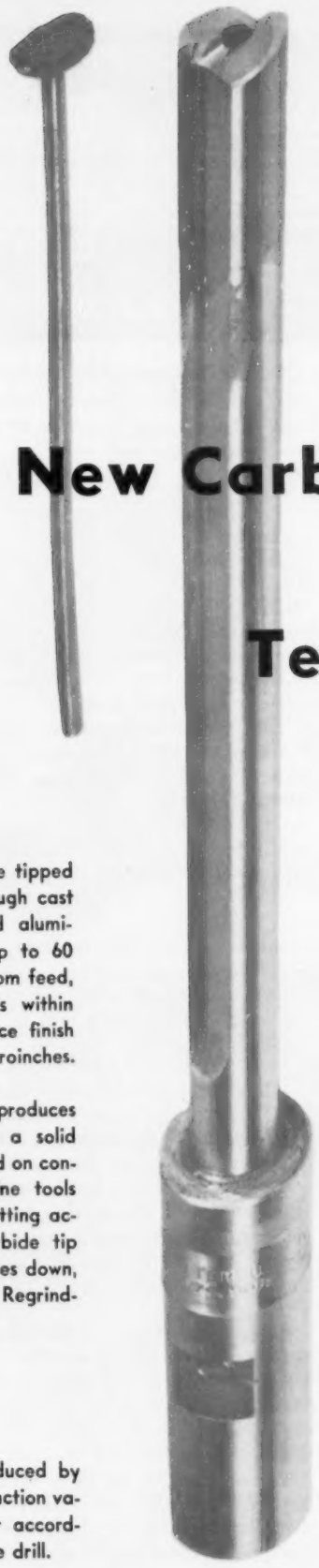
Feeds to 60 ipm—

New Carbide Tool Drills Cast Iron Ten Times Faster



◆ A new carbide tipped drill whizzes through cast iron, bronze and aluminum at feeds up to 60 ipm . . . At 15 ipm feed, hole tolerance is within 0.0002 in., surface finish is a smooth 4 microinches.

◆ Hollow drill produces both chips and a solid core, can be used on conventional machine tools . . . Balanced cutting action of the carbide tip keeps thrust forces down, tool life up . . . Regrinding is simple.

Right: PIN produced by the trepanning action varies in diameter according to size of the drill.

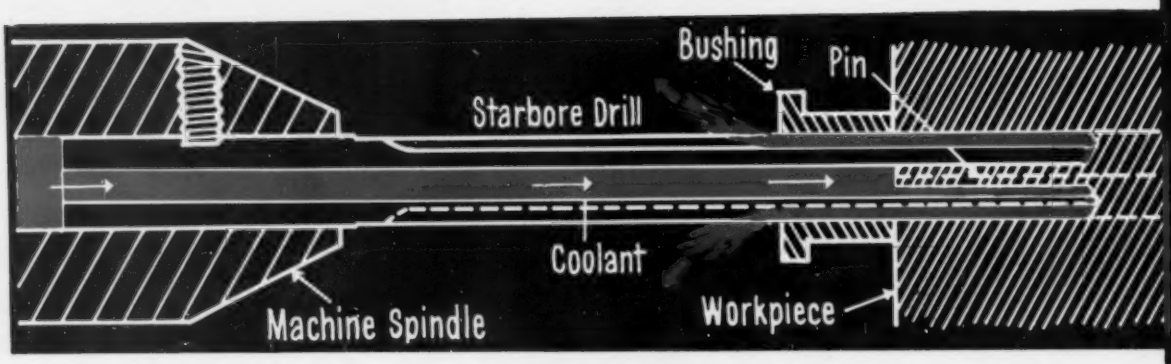
◆ PRECISION HOLE DRILLING at rates up to 60 ipm in solid cast iron, bronze and aluminum; and up to 20 ipm in steel is possible with a new carbide tipped tool. In operation, it combines the advantages of an oil-fluted drill and a trepanning tool.

Even when the new drill is used at four times the more or less conventional rate of 3 ipm for a high speed steel tool, it produces holes that need no subsequent finish drilling, reaming or boring.

For example, at a 15 ipm feed rate, holes can be drilled in cast iron to come within a tolerance of 0.0002 in., and with a surface finish as smooth as 4 microinches, rms (root mean square). And where only an average "as-drilled" finish is required, the tool can be fed up to 20 times the conventional 3 ipm rate.

Built to last

Designed for long life and efficiency in fast, precision hole making, the new Starbore drill was developed and is manufactured in a wide variety of sizes by the Star Cutter Co., Farmington, Mich. Drill shanks of varying length are made from SAE 4130 steel tubing, and can be furnished either straight or tapered according to customer specifications or drilling machine requirements.



COOLANT, forced under pressure through the off-center hole to the carbide cutting edges, flushes drill chips outward and back through flutes along the shank of the tool.

The carbide drill tip is a hollow, circular molded piece which is brazed to the tubular shank. Conventional carbide grades are used, and about ½ in. of carbide tip life is provided in the standard two-flute design.

An off-center hole running the full length of the tool directs a high-pressure coolant stream to the cutting edges. Chips are flushed back and out of the hole through flutes along the drill shank. The off-center hole also permits one of the two or more balanced carbide cutting edges to produce a small pin of solid metal during the drilling process, in the manner of a trepanning tool. This action avoids the zero surface speed condition that prevails at the tip of a pointed drill.

The correct combination of speed and feed depends on the type of material being drilled and the type of finish desired. In general, smoother holes are produced by these carbide tipped drills as speed and feed decrease.

Tests on cast iron parts indicate that in the ½ in. diam range, a surface speed of 345 fpm with a 15 ipm feed will produce holes with a surface finish of 10 to 25 microinches, rms. At 60 ipm feed and a speed of 575 sfpm, surface finish of the holes ranges from 40 to 50 microinches.

Holds close tolerances

Other tests show that holes in the same ½ in. diam category can be drilled in cast iron, aluminum and bronze within a total tolerance of 0.0002 in. for both size and taper. This accuracy is maintained regardless of variations in the feed rate between 15 and 60 ipm. In steel parts, tolerances of 0.0005 in. can be consistently held at feeds up to 20 ipm.

In actual production on a cast iron valve control housing, the new drill produces a 0.499-in. diam hole, 6-in. long, in just 36 seconds. A combination of 3000 rpm speed and 10 ipm feed results in a hole with a surface finish of 25 microinches and a tolerance within 0.0005 in.

In another production operation involving the drilling of aluminum bushings, a ½ in. diam drill produces a 2-in. long hole in just 6 seconds. Hole tolerance is 0.0005 in., and the resulting surface finish measures 8 microinches, rms. Feed in this case is 20 ipm; the speed rate is 4500 rpm.

One of the new carbide tipped drills in a 0.475 in. diam size also requires just 6 seconds to drill a hole 1 7/16 in. long in bronze cylinder blocks for pumps. Hole tolerance in this production setup is 0.0002 in., and the surface finish is 16 microinches. Drill feed is 15 ipm and the speed is 3500 rpm.

Bushing aids drilling

Starbore drills can be used on conventional machine tools that will provide drilling speeds of from 200 to 500 sfpm, together with desired feed rates. The drills will work equally well whether the work or the tool is turned.

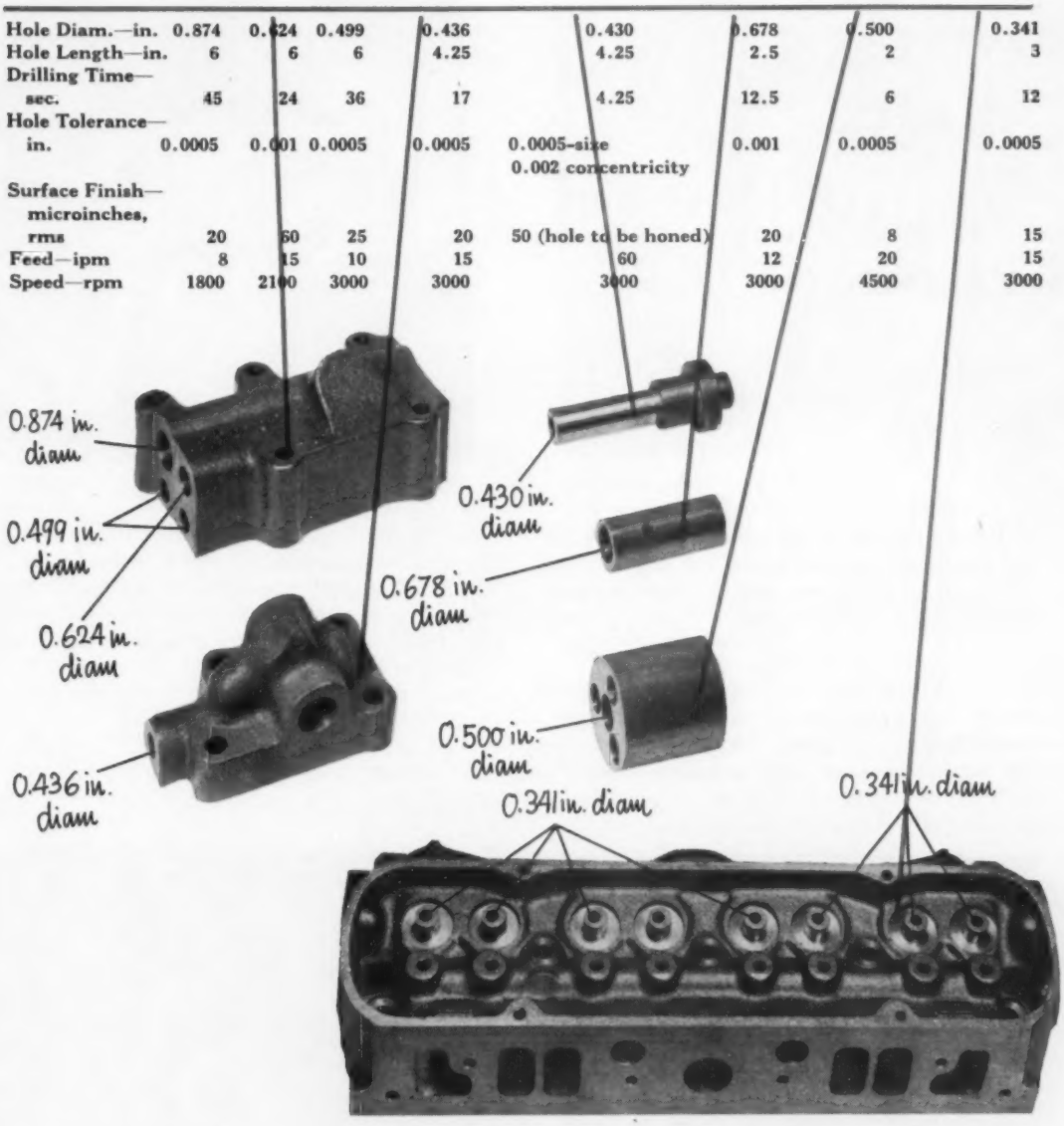
The tool is designed to operate through a hardened and ground steel or carbide bushing in contact with the work. This insures optimum operation and maximum tool rigidity.

A fixture must be used to provide accuracy of alignment where holes have to be drilled concentric with the outside diameter of a part. A modified drill can be used in conjunction with a bushing to enlarge a previously drilled hole, even in cases where a bad off-center condition exists.

Thrust-meter tests in the manufacturer's research department show that the new drills work at about ⅓ the thrust load of a regular high speed steel twist drill operating at conventional speeds and feeds. In an actual production check, a 7/16 in. diam carbide-tipped drill required 2.3 hp as it drilled a cast iron part at 3000 rpm and a feed rate of 15 ipm. Horsepower drive requirements will vary with the type of material and metal removal rate.

Here's What These Drills Do on Production Parts

	Cast Iron Valve Control Housing			Cast Iron Valve Control Housing	Cast Iron Valve Stem Bushing	SAE 1213 Steel Bushing	Aluminum Bushing	Cast Iron Engine Cylinder Head
Hole Diam.—in.	0.874	0.624	0.499	0.436	0.430	0.678	0.500	0.341
Hole Length—in.	6	6	6	4.25	4.25	2.5	2	3
Drilling Time—sec.	45	24	36	17	4.25	12.5	6	12
Hole Tolerance—in.	0.0005	0.001	0.0005	0.0005	0.0005-size 0.002 concentricity	0.001	0.0005	0.0005
Surface Finish—microinches, rms	20	60	25	20	50 (hole to be honed)	20	8	15
Feed—ipm	8	15	10	15	60	12	20	15
Speed—rpm	1800	2100	3000	3000	3000	3000	4500	3000



In another production run, 4650 in. of cast iron were drilled at 10 ipm feed without any drill sharpening whatsoever. At the end of the run, holes were still being produced within 0.0002 in. tolerance.

Conventional surface grinders can be used in conjunction with a simple fixture to sharpen these carbide tipped drills. Two diamond grinding wheels; an OD wheel and one of the cupped type are needed.

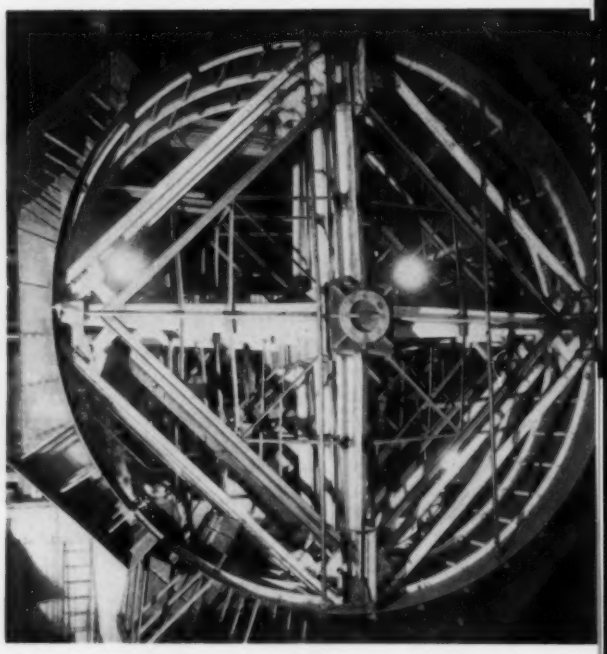
A conventional sulphur-base chlorinated oil works satisfactorily as a coolant for the new tools in production drilling operations. Coolant pressures as low as 60 psi have been adequate under certain conditions, although most drilling with these tools requires pressures in the 200 to 400-psi range.

Suitable coolant handling equipment, in conjunction with filters and a magnetic separator, is necessary to adapt the new drills to either conventional or special machine tools.

The solid, small-diameter pin produced by this drilling technique is flushed away from the drill when it breaks away from the part. Pin thickness increases slightly as the drill is resharpened.

Fixture boosts speed—

Weld Giant Tunnel Tubes on Assembly Line



◆ Fabricating the double-walled steel casing for an underwater vehicular tunnel is a king-sized job . . . Sections 300-ft long must be weld-assembled, then floated to the tunnel site.

◆ Baldwin-Lima-Hamilton Corp. makes a complete section in less than two weeks on a well planned assembly line . . . A giant fixture speeds the forming and joining of both inner and outer tubes.

◆ A HUGE DOUBLE-WALLED tube made from all-welded steel sections will enclose a vehicular tunnel now being built under the waters of Hampton Roads, Va. Fabrication of the massive tube-casing segments is done on an almost continuous assembly line of Baldwin-Lima-Hamilton Corp.'s Large Weldment Dept. in Philadelphia.

The tunnel project calls for 6900 ft of double-wall casing. This requires 23 sections, each

STEEL plates for the 15-ft long subsections are cut with precision flame cutting machines.

Left: **POSITIONER speeds subsection welding. It rotates so that welding can be done downhand.**

300-ft long, which are made by weld-joining a series of shorter subsections. The inner, circular wall of each segment is 33 ft in diam, while the octagonal-shaped outer wall measures 37 ft across outside flats.

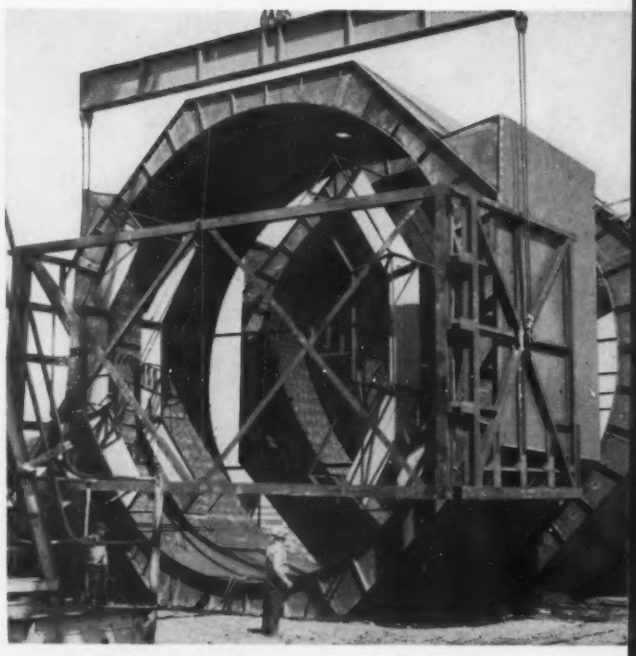
At the present production rate, it takes less than two weeks to weld-assemble a complete 300-ft section. A major factor in achieving this rate of speed is a giant welding positioner which the company designed and built. It drapes and holds the various steel plates in place for final welding assembly.

Flame cut all plate

Fabrication of each 300-ft tube section begins with the cutting of steel plate to the exact dimensions, contours and edge angles required for the shorter subsections. This is done with Airco precision flame cutting equipment.

To make the circular inner wall, two 52-ft long by 90-in wide flame cut sheets are positioned side-by-side in the long direction and welded together. This section is then mounted on the welding positioner so as to form a half circle. It is then endwelded to another sheet which has been similarly prepared and positioned, thus forming the full circle.

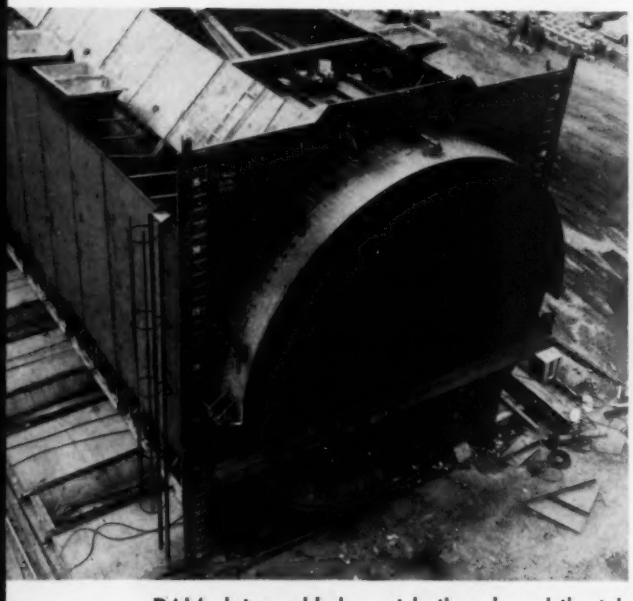
Next, outward-jutting supports are welded to the outer diameter of this circular ring. The ¼-in thick plates which form the eight-sided outer ring are then welded to these supports and also to each other.



DOUBLE-walled subsections are butted together and weld-joined to form full 300-ft sections.

The welding positioner on which both the inner circle and outer shell are formed and joined rotates in such a manner that all welding can be done in a downhand position. All plate material is lifted into place on the positioner by means of large cranes. When a 15-ft long subsection is completely welded, the same cranes lift it onto a transportable cradle.

Final welding to join the subsections is done outdoors. They are butted together to form a 300-ft length of tunnel casing, which is then moved by electrically-controlled winches to a launching site along the Delaware river.



DAM plates welded on at both ends seal the tube sections for voyage to the tunnel site.

Tow sections down river

Because of their size and bulk, the 300-ft sections are floated and towed to the tunnel construction site at Hampton Roads. However, before they are launched, both ends of the section are sealed by welding steel dam plates in place, and the space between the inner and outer walls is partially filled with concrete ballast.

Finish work is accomplished at the actual tunnel site. Roadbeds are built inside each 300-ft length of tunnel casing. Completed sections are then towed into position, sunk beneath the water and locked into place in a dredged trench. When completed, the 6900-ft tube will be the underwater part of a four mile span across Hampton Roads.

Molybdenum at work—

New Carburizing Steels For Critical Gearing

◆ Top carburizing quality with greater economy is the major selling point of a new series of carburizing steels . . . Putting molybdenum to work as the chief alloying element, these steels can be quenched directly from carburizing temperatures *without* excessive retained austenite.

◆ For maximum wear resistance, they can provide a 63 Rc surface hardness at the higher carbon levels. And—thanks to a low carbon "core", they are easy to machine.

PART I

By: R. S. ARCHER, Chief Metallurgist,
V. A. CROSBY, Metallurgist, and G. A. TIMMONS, Director of Research,
Climax Molybdenum Co., New York

◆ A NEW SERIES of carburizing steels—containing molybdenum as the principal alloying element—are proving to be top flight for highly loaded gears and other critical applications.

Some of these brand new steels contain as much as 1.0 pct molybdenum. Thanks to this alloy addition, all of the steels tested are found to be ideal for the production of carburized parts quenched directly from the carburizing temperature (1700°F). Results indicate high case hardness with low retained austenite.

The new steels, developed by Climax Molybdenum Co., are not prone to excessive austenite retention even when case carbon content runs as high as 1.10 pct. The high surface hardness obtained at the higher carbon levels guarantees maximum wear resistance.

Many of the carburizing steels used by U. S. industry contain molybdenum. Concentrations seldom exceed 0.30 pct and are used chiefly to add hardenability to steels alloyed principally with nickel (4600 and 4800 series), or chromium (4100 series), or combinations of both (4300, 8600, 8700 and 9300 series).

Molybdenum has been the essential alloying element in only one series of standard carburizing steels—the AISI 4000 series. These have been widely used with very satisfactory results. But even in this series which contains 0.20-0.30 pct molybdenum, manganese is specified at 0.70-0.90 pct.

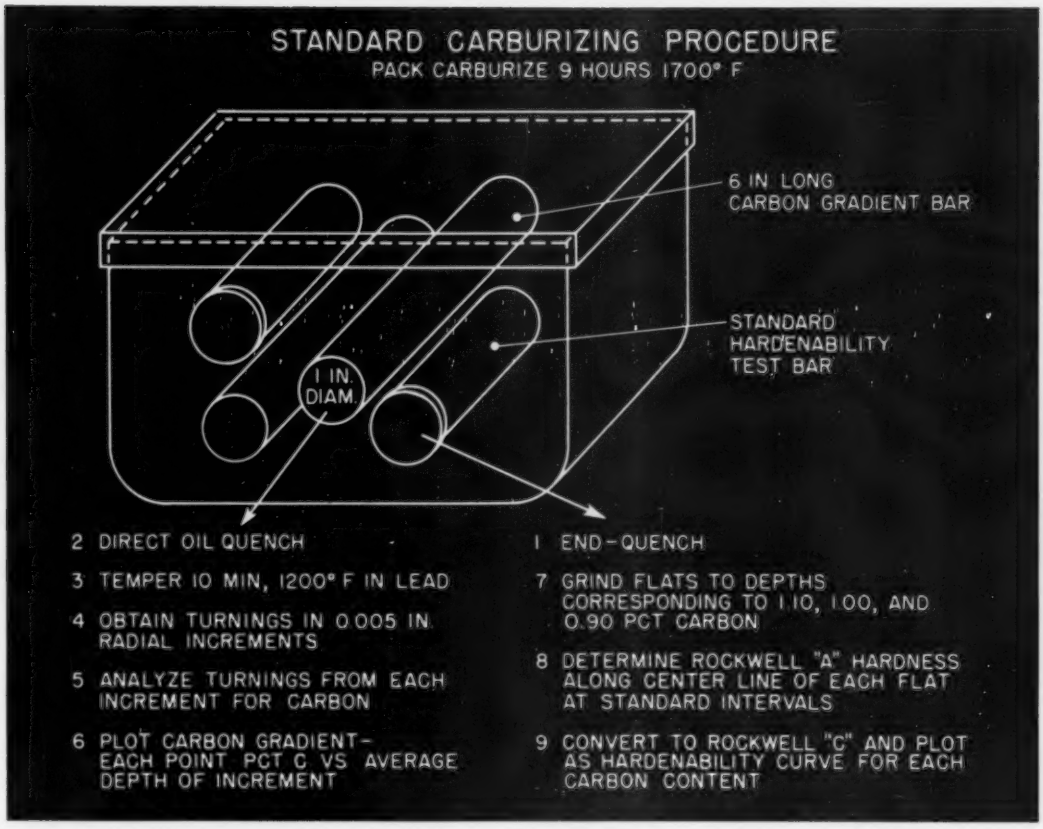
Because the concentrations of other alloying elements have always been higher than the concentration of molybdenum, the characteristics of alloy carburizing steels have been determined largely by the effects of the other elements. In every instance, they have tended to overshadow, or mask, the principal beneficial effects of molybdenum. Thus many of the important effects of molybdenum have remained virtually unknown.

Carburized gears tougher

Carburized steel parts call for a number of special requirements. They are used chiefly where high surface stresses are imposed during motion. Examples of such parts are pinions, gears, cams, and journals.

To resist wear, scuffing, and galling, high carbon content and high hardness are essential. To resist failure under severe loading,

This article, the first of a two-part series, gives the background of an important metallurgical development. PART II, covering hardenability data, pilot lot test results, and a summary of this investigation, will appear in the Feb. 23 issue.


STANDARD CARBURIZING PROCEDURE
PACK CARBURIZE 9 HOURS 1700° F
6 IN LONG
CARBON GRADIENT BAR
STANDARD
HARDENABILITY
TEST BAR
1 IN.
DIAM.
2 DIRECT OIL QUENCH
3 TEMPER 10 MIN, 1200° F IN LEAD
4 OBTAIN TURNINGS IN 0.005 IN. RADIAL INCREMENTS
5 ANALYZE TURNINGS FROM EACH INCREMENT FOR CARBON
6 PLOT CARBON GRADIENT—EACH POINT PCT C VS AVERAGE DEPTH OF INCREMENT
1 END-QUENCH
7 GRIND FLATS TO DEPTHS CORRESPONDING TO 1.10, 1.00, AND 0.90 PCT CARBON
8 DETERMINE ROCKWELL "A" HARDNESS ALONG CENTER LINE OF EACH FLAT AT STANDARD INTERVALS
9 CONVERT TO ROCKWELL "C" AND PLOT AS HARDENABILITY CURVE FOR EACH CARBON CONTENT

high case strength and high endurance limit are required.

Such parts could be made of high carbon steel. But high carbon steels are difficult to machine, especially into such complicated parts as hypoid gears and pinions. Also, they have a tendency to crack in hardening. Thus it is usually more economical to machine the parts from low carbon (0.10-0.30 pct) steel, carburize the wearing surfaces to the desired carbon content, and then harden by quenching.

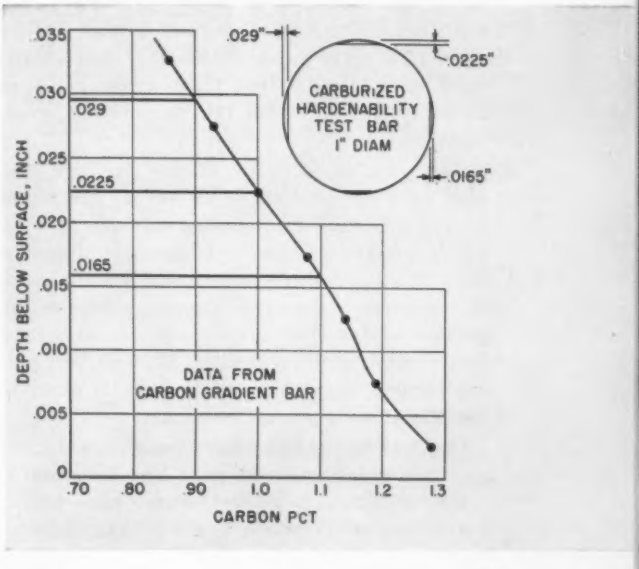
Another advantage of carburized parts is their inherently greater toughness when compared with through-hardened parts of high carbon steel. This increased toughness is due to the low carbon core.

In the past, much importance has been attached to the toughness of the core as insurance against brittle fracture. Izod and Charpy impact values were usually considered in the selection of a carburizing steel and sometimes were included in specifications. Maximum limits on core hardness were often set to meet the toughness requirement.

It is recognized that severe impact loads are imposed on some gears in special applications, and that the progress of a failure starting at the surface of a carburized part might be re-

Above: **FIG. 1—Schematic drawing and outline of tests for end quench and carbon gradient bars.**

Below: **FIG. 2—Carbon content of test bars is plotted as a function of depth below the surface**



tarded by a tough core. But for most automotive gears, high core toughness is no longer a major factor in the selection of a carburizing steel.

Recent engineering studies have shown that most automotive gear failures result from fatigue rather than impact and that the fatigue failures originate in the surface layers of the part where the stresses applied in service are most severe. For this reason, attention is being given to improving gear performance by the prevention of fatigue failures.

By intentionally developing residual compressive stresses at the surface of a part to oppose the tensile stresses applied in service, the maximum tensile stresses to be sustained by the metal are reduced. Surface compressive stresses are generated chiefly by developing a high carbon case of maximum hardness on a low carbon core of low hardness.

Although the core must have adequate hardness and strength to support the hard case, higher core hardness is usually accompanied by reduced compressive stresses at the surface. Such a condition is undesirable.

An ideal carburizing steel should be capable of conditioning by a simple heat treatment to a structure suitable for rapid, economical machining. Especially important in the production of gears are surface finish and cutter life. These depend upon freedom from excessive inclusions as well as upon suitable structure and hardness.

Uniform response to both hardening and annealing is also required. If finished parts are to be uniform with respect to hardness pattern, stress pattern, and distortion, then uniform response to heat treatment is essential.

Ideal steel defined

For sliding (abrasive) loads, maximum indentation hardness is preferred.[1] The ideal steel should, therefore, develop a high carbon (0.90-1.10 pct), hard (63-66 R_c), martensitic case substantially free from austenite upon direct quenching from the carburizing treatment.

Technical publications of the past two decades have shown that nickel favors the retention of austenite in quenched sections of steel which contain 0.80 pct or more carbon in solution. Manganese exerts a similar effect. Chromium favors high carbon concentrations at the surface of the steel after treatment in strong or active carburizing media.[2] High carbon concentrations in solution at the time of quenching also favor austenite retention.

Contrary to a rather general belief, the authors expected molybdenum to have less tendency to cause retained austenite. They also anticipated that molybdenum would be less likely to promote excessive surface carbon concentrations.

To determine the carburizing and hardening characteristics of low-carbon steels alloyed principally with molybdenum, a series of steels containing approximately 0.20 pct carbon, with molybdenum from about 0.4-1.0 pct, was evaluated. Manganese was varied from 0.50 to 1.25 pct, thus bringing out the effects of manganese in concentrations both above and below that of the standard AISI 4000 series.

Laboratory heats were produced in a 30-lb induction furnace, with late aluminum additions to produce a fine McQuaid-Ehn grain size. The ingots were forged to 1¼ in. square bars from which test specimens were prepared.

Commercial practice followed

Specimens of several standard carburizing steels were either prepared in the same way or from bars obtained from commercial heats. Eventually, specimens of one of the experimental compositions containing 0.50 pct Mo and 0.50 pct Mn were also obtained from production heats.

In planning the investigation, consideration was given to current trends in commercial carburizing and hardening practices. In particular, there has been an increasing trend toward direct quenching from the carburizing temperature immediately after carburizing. Such practice is economical and tends to minimize distortion.

There has also been a marked trend toward gas carburizing for large production operations. It is believed, however, that there will continue to be a substantial amount of pack carburizing where the production is not sufficient to justify the more elaborate equipment required for gas carburizing.

A brief survey of some of the largest consumers of carburizing steels indicated that they usually attempted to control surface carbon content at some level in the range 0.85-1.10 pct. With this in mind, the laboratory testing procedure was planned to determine the maximum case hardness and the "case hardenability" of each experimental composition at the three carbon levels of 0.90, 1.00, and 1.10 pct.

Partly because gas carburizing equipment with suitable control was not available in the laboratory, all specimens were pack carburized in a covered alloy steel box. The box was heated for 9 hours at 1700°F in an electric furnace. An active carburizing compound was used, of the following composition: charcoal—50 pct, coke—30 pct, barium carbonate—12 pct, sodium carbonate—3 pct, calcium carbonate—3 pct, and molasses binder—2 pct.

Although it is common industrial practice to employ 4 or 5 parts of used compound to 1 part of new, in these expreiments 100 pct new compound was used in each run.

This was done for three reasons. First, it was found that more reproducible conditions could be maintained than by using a mixture of old and new compound. Second, it was desired to compare the various steels with respect to tendency to build up excessive surface carbon contents under rapid carburizing conditions. Lastly, this treatment was known to carburize 1018 (plain carbon) steel to approximately 1.20 pct carbon at the surface. The procedure thus insured a carbon content of 1.10 pct at some depth below the surface of each hardenability specimen.

Case hardenability was determined by a modification of the procedure originally proposed by Jominy and Boegehold in 1937.[3] A standard end quench test bar of each composition was carburized for 9 hours at 1700°F along with a "carbon gradient" bar of the same composition, 1 in. diam. x 6 in. long (Fig. 1).

At the end of the 9-hour period, the end quench bar was fixture quenched and the carbon gradient bar was immersion quenched in oil. The hardenability specimens were quenched within five seconds after removal from the box, except in a few tests in which specimens were intentionally allowed to air cool to 1550° and 1200°F before quenching.

The "carbon gradient" bar was rapidly tempered at 1200°F to facilitate machining while permitting only a negligible diffusion of carbon in the case. Successive layers, 0.005 in. thick, were cut from the cylindrical surface of the carbon gradient bar. The turnings of each layer were analyzed for carbon. The carbon content of each layer was plotted against the average depth of the layer below the surface.

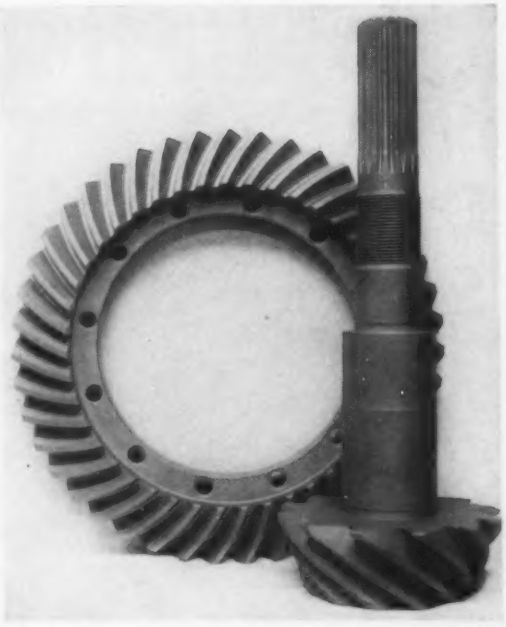
Carbon gradients measured

The resulting curve was identified as the "carbon gradient curve." It provided two important facts: 1) the carburizing characteristics of this steel under the "standard" conditions of the carburizing cycle and, 2) the depths beneath the surface of the three standard carbon levels of 0.90, 1.00, and 1.10 pct.

After determining the depths below the surfaces of the carburized bars at which these three carbon levels prevailed, the end quench specimen was ground to each of these depths for hardness tests. This procedure is shown in Fig. 2.

Hardness tests were run according to regular Rockwell procedure except that the A (60-Kg load) determinations were made to minimize the effects of underlying layers of lower carbon contents. Also, the first impression was made at the 2/16 in. position because the end of the specimen was carburized.

To aid interpretation, the A hardness values were converted to C values, using ASTM standard conversion charts. The C values were then plotted on standard end-quench data sheets. From these curves, the surface hardness of a carburized part made from the steel tested may be predicted when the surface carbon content and the rate of cooling of the surface are known.



CRITICAL automotive ring gear and pinion typify parts made of 0.50 pct Mo- 0.50 pct Mn steel.

It is to be emphasized that the carbon gradient of the end-quench specimen does not enter into the interpretation of the hardness curves. The carburized end-quench specimen simply provides a means by which the maximum hardness and the case hardenability of the steel can be measured at each of the three carbon levels.

For these measurements, it is of no consequence how far beneath the surface of the end-quench bar each of these carbon levels occurs.

The evaluation of each experimental composition also included the standard hardenability (or core hardenability) test, in which the steel is austenitized for 20 minutes and then end-quenched. Complying with the standard procedure, all "core" specimens were quenched from 1700°F.

REFERENCES

1. Metals Handbook, 1948 edition, p. 682—2. "Carburizing Characteristics of 0.20 Carbon Alloy and Plain Carbon Steels." G. K. Manning. Transactions ASM Vol 31 (1943) p. 8.—3. American Society for Metals, Vol 26 (1938) p. 574.

Aisles may be answer—

Do You Really Need More Storage Space?

◆ With warehouse space worth $5 to $10 per foot, aisle space is at best a necessary evil . . . True, industrial trucks need room to maneuver and stack—but how much room? . . . Amount is dictated partly by size and shape of stored units.

◆ A major limiting factor has long been space required by the girth of trucks themselves . . . Twelve foot aisles are still common in many plants . . . New, slim silhouette trucks permit reductions up to 50 pct in aisle space without impairing efficiency.

◆ IN A WAREHOUSE or storage area every square foot of space not utilized for storage represents idle capital, worth perhaps $5 to $10 per square foot at today's prices. New, slim silhouette fork lift trucks especially designed for close quarters operation now make it possible to reduce aisle space requirements—in some cases by as much as 50 pct.

At the same time, the trucks have a longer reach, permit higher stacking. This is an added bonus, since it costs no more in square feet to stack goods up to the ceiling than to settle for a lesser height. Where order picking is involved, the narrower aisles can also save considerably in labor costs. An order picker is estimated to spend 60 pct of his time walking from one stack to another; less than half his time goes for actual picking, loading and checking. Narrower aisles thus save him steps, speed identification of materials—up his total output.

How much aisle space?

Naturally, a certain amount of any storage area must be given over to aisle space. The problem: How much? And the answer: Enough to permit adequate access to materials stored—and no more. Any surplus of aisle space beyond this necessary minimum is a wholly unproductive luxury. But how narrow can aisles be without hampering stacking operations?

In many plants and warehouses 12-ft aisles are still common. This is true because many types of material handling equipment still need the elbow room to maneuver for right angle stacking, even where the stored units measure 4 sq ft or less. Figuring 10 of these 12-ft areas in a 200-ft long storage area, there are 24,000 sq ft of empty space—perhaps half of the total warehouse areas. At, say, $7 per sq ft, the investment in this space comes to $168,000.

Clearly, any materials handling system which could convert even part of this space to useful storage area could mean economies. Fork lift trucks are the most widely used equipment for moving materials through storage areas.

Manufacturers of such equipment responded with the development of narrow-aisle trucks. Now the same 4 x 4 ft pallet or other load that required 12-ft aisles can be right-angle stacked in a space just half that width.

Western Electric is among the many companies which has had to cope with the problem of fitting more goods into existing facilities. WE stocks the multifarious equipment used by local Bell Telephone companies, storing it at 29 distribution centers across the country. Practice in these warehouses has been to stack loads along 10-ft aisles. Trucks used had a 2000-lb capacity and 120 in. of lift.

It became evident that many of the palletized loads going through the warehouses were running more than 2000 lb. Company materials handling engineers then set about reviewing the whole storage problem. Their decision was to replace their trucks with equipment capable of lifting 3000 lb loads to a height of 158 in. And they decided to cut aisle width from 10 ft down to 7 ft.

For many warehouses and storage areas, aisle widths of 6 or 7 ft represent the practical minimum that will permit order carts to pass each other. Where such two-way traffic is not required, and maximum use of space is the important thing, there are fork trucks capable of right-angle stacking in tighter aisles.

By J. H. LEWIS
Sales Manager, Power Div.,
Lewis Shepard Products, Inc.
Watertown, Mass.

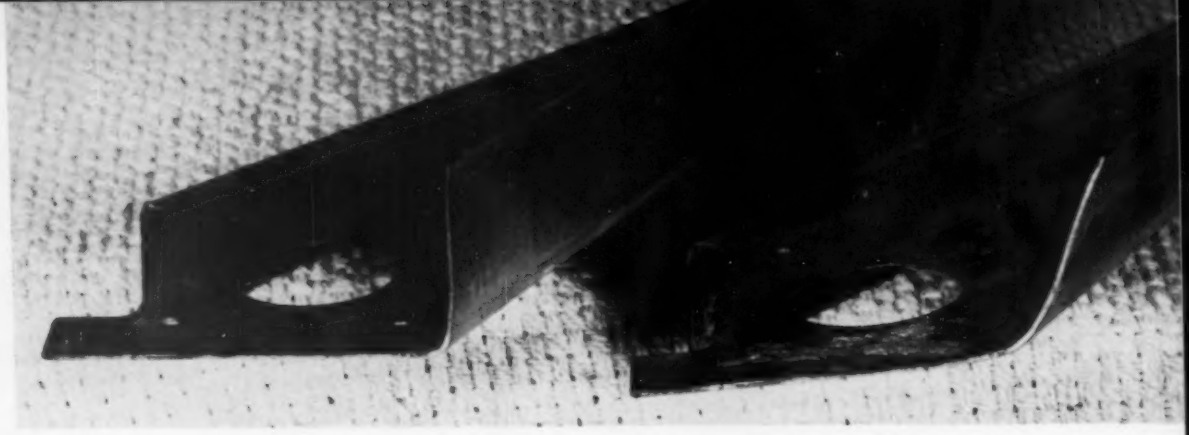
The Foxboro Co. is a case in point. This manufacturer of process control instruments has steadily expanded its output, making storage space a chronic problem. To get around the necessity for putting up another building, Foxboro decided to reduce aisle widths to 58 in., an exceptionally narrow space but wide enough for its purposes. They then acquired a Lewis-Shepard Jackstacker, a walkie-type that handles loads to 4000 lb and lifts to heights of 176 in. This has proved completely stable.

Expand inward, upward

Thus warehouses that appear to be bursting at the seams may be able to add thousands of feet of additional storage space by cutting down aisle widths and utilizing more of the rent-free space that probably already exists between stacks and roof. Modern fork lift trucks have been specifically designed with this in mind. And they represent a much lower investment than the construction or rental of additional floor space.

Above—Right: **SIDE-SADDLE FORK TRUCKS like these allowed Western Electric warehouses to cut aisle space from 10 ft to 7 ft without sacrificing maneuverability. Truck lifts 3000 lb to 176 in. height, 18 in. higher than was specified.**

Right: **FIFTY-EIGHT INCH aisles suffice Foxboro Co., with this walkie type lift truck, which handles loads to 4000 lb., lifts to almost 15 ft.**



TITANIUM sheet of differing yield strengths exhibits variable springback. Parts shown are from different titanium lots, but formed under the same conditions on identical tools.

No more springback—

Control Heat To Drop Titanium Forming Costs

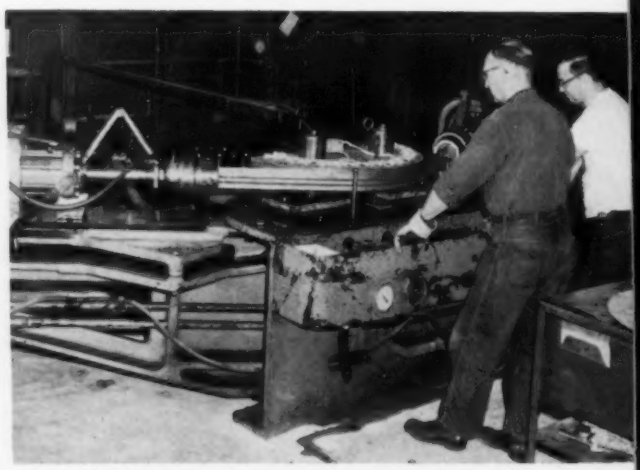
◆ EXCESSIVE fabricating costs and high producer prices deter titanium from assuming its rightful role as a major structural material. Controlled heat in hot forming promises an immediate answer to top-heavy production costs. The average shop employing heating equipment now can fabricate commercially pure titanium sheet into almost any shape possible with stainless steel or aluminum, using standard press equipment.

Elimination of variable springback is the key to the situation. Time and labor formerly required for post-forming lineup is reduced considerably, though not eliminated. Scrap loss is

By A. E. LEACH, Metallurgical Engineer
and H. M. LUNDSTROM,
former Metallurgical Engineer,
Bell Aircraft Corp., Buffalo

◆ Titanium can now be fabricated in the shop almost as readily as sheet aluminum or stainless steel—and at reasonable costs . . . Solution of springback problem brought about the breakthrough.

◆ Variable springback of titanium has baffled even experienced shop foremen . . . Excessive post-forming lineup and high scrappage resulted, boosting production costs . . . Hot forming segregated lots is part of the answer.



STRETCH FORMING a titanium channel on cartridge-resistance heated Kirksite dies enables accurate control of springback. Forming blocks normally are maintained at 300°F.

down also, a happy circumstance considering the $10 to $15 per pound price of titanium sheet.

Typical springback troubles in room temperature forming are illustrated in the accompanying table. Values shown are for bending 0.025-in. titanium sheet through 90° over a block of 1-in. radius, and were calculated from Fig. 1 after the method of Brown, Binder and Franks. The last column of the table clearly depicts why titanium still is considered a cantankerous metal by shop foremen.

Bell Aircraft Co. substantially eliminated the springback problem by: (1) demanding from producers—and getting—titanium sheet to closer specifications, (2) special handling and marking of incoming sheet, (3) substituting hot forming for cold forming to obtain more uniform parts.

Experience has shown a forming temperature in the 450° to 600°F range is required to overcome the springback problem. Stretch or press forming over cartridge-heated dies is recommended since temperature tolerances are relatively easy to maintain on such equipment.

Temperature control in cold die drop hammer forming is difficult because necessary transfer operations permit excessive temperature drop. Time required for correct placement of rubber blocks varies also, resulting in differing final forming temperatures from one piece to another. Inability to closely control forming temperature probably accounts for discrepancies in prior reports on hot forming titanium.

In stretching operations, the simplest form of deformation, three major factors control springback: (1) elastic limit, (2) elastic modulus, and (3) work hardening rate. Actual forming operations can be more complex and involve other factors. But for all practical purposes, measurement of these three properties gives a good comparison of springback characteristics in various materials.

TYPICAL SPRINGBACK VALUES IN TITANIUM FORMING*

0.2 Pct. Offset Yield Strength, psi	Final Part Radius, in.	Springback, degrees
67,525	2.10	47.2
73,350	2.40	52.6
87,500	2.85	58.5
99,650	3.90	67.0
108,700	5.55	73.8

* Bending 0.025-in. commercially pure titanium sheet over a block of 1-in. radius through an angle of 90°.

HOT FORMING titanium originally called for heating in oven, transferring to drop hammer with cold dies, striking before appreciable cooling. Operation was better than hand forming.

Elastic modulous and rate of work hardening do not vary significantly from one titanium sample to another. But yield strength (and elastic limit) shows no such conformity. Much titanium sheet now produced exhibits a considerable variation in yield strength between heats or lots. Yield strength as used here refers to the stress at which the material has a permanent set of 0.2 pct.

This variance in yield strength is permitted of necessity in current procurement specifications. Producers have not gained sufficient control over interstitial content to guarantee close tolerances on yield strength. However, titanium men do know of fabricator's troubles, and are making progress in the direction of better quality control.

Standardizing yield strength

In recent months, some efforts to control physical properties of sheet titanium have borne fruit. Now a given band in the specification range is aimed for. At least one producer will certify lots of titanium sheet to tolerances of ±5000 psi from reported yield strength.

Knowing yield strength in each titanium lot is a gain, whether the information is supplied by the producer or your own metallurgical laboratory. But this is only the first step toward controlling springback.

Next is the necessity of segregating incoming material according to its yield strength. At Bell Aircraft, titanium sheet is graded into ranges of

POINTERS ON HOT FORMING TITANIUM ECONOMICALLY

1. **Establish yield strength for each batch of titanium sheet.**
2. **Separate batches according to yield strength.**
3. **Analyze part design, then determine yield strength acceptable.**
4. **Establish correct forming temperature by reconciling need to reduce variable springback with need for maximum ductility. (e.g., if forming is not severe, then ductility may be neglected and the highest practical temperature used to reduce yield strength spread.)**
5. **Eliminate all delayed transfer of heated material prior to forming, if practicable.**
6. **Form at optimum temperature.**

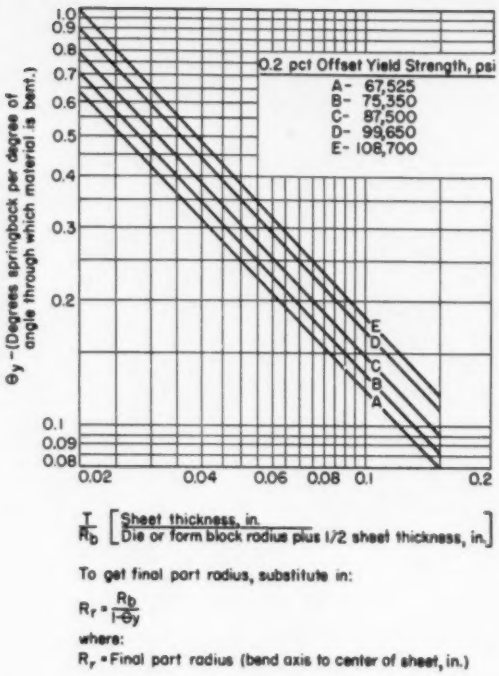


FIG. 1—(Right) Titanium Springback vs Ratio of Sheet Thickness to die or form block radius.

60,000 to 65,000 psi, 65,000 to 70,000 psi etc. Extent to which segregation is practiced depends on several factors, among them flexibility of tooling and complexity of parts.

Parts to be fabricated of titanium are analyzed to ascertain the relative importance of springback in each individual design. With some components, material falling into only one yield strength grade is satisfactory. In others, sheet of any yield strength can be used.

Obviously, springback is not a factor in flat parts that require blanking or drilling. For critical parts, tooling is developed for material of a certain yield strength, and this material is used at all times for those parts.

Minimize springback by hot forming

Need for hot forming within critical temperature ranges is clearly shown in Fig. 2. Yield strength in three different batches of as-received titanium sheet varies from 72,000 to 87,500 psi at room temperature. If bent through an angle of 90° over a 1-in. mandrel, 0.025-in. sheet from the three lots may spring back between 50 and 60°. Obviously this situation is intolerable from a manufacturing viewpoint.

But heated to 500°F, yield strength curves of the same three batches of titanium virtually merge at 28,000 psi. Springback of titanium in the same sheet thicknesses should be nearly identical at this approximate temperature. Experience confirms this on all commercially-pure titanium sheet regardless of source.

Springback can thus be controlled in mass production operations by forming in the temperature range at which yield strengths of the various titanium lots are equivalent. Normally, a constant heat of 450° to 500°F is satisfactory.

Selection of the best possible forming temperature for a particular manufacturing operation requires consideration of another factor: ductility. To minimize tearing and fracture of the material in plastic deformation, choose that temperature at which maximum ductility occurs.

Although forming operations usually are controlled by either uniform elongation or local elongation at fracture, total elongation has proven a good guide in selecting forming temperatures.

As shown in Fig. 2, percentage elongation of commercially pure titanium sheet normally peaks at about 450°F, then again in the 1000°F range.

Compatability of yield strength and total elongation values at the lower temperature suggests forming in that range, rather than at 1000°F. Practical difficulty of tooling for forming at temperatures above 600°F reinforces the decision.

Most economical forming costs will be found at that temperature satisfying both yield strength and ductility requirements.

From its earliest experience in production of titanium parts and assemblies, there has been a

continuous effort at Bell Aircraft to minimize effects of variable springback and to promote more economical operations. Hand lineup became an early target of this program, and will continue until forming difficulties are reduced to the lowest possible level.

Hand lineup is used in the airframe industry for minor modifications of contour. Ordinarily, the operation requires little time, and scrap loss is practically nil. With titanium, this was an expensive and highly unsatisfactory operation. Titanium parts requiring final lineup often were so nonuniform in shape that each presented a challenge to the lineup man. The metal can be hammered so little at room temperature that scrappage previously was very high.

First attempt at solving this problem involved local torch heating. This made the metal much easier to work, and reduced scrappage. But it introduced the hazard of contamination from overheating. And it still left labor time much higher than that required for other materials.

Efforts were directed at modifying basic tooling practices and forming techniques to reduce the amount of hand lineup.

The drop hammer became a valuable tool in the initial stages of this program. Originally, drop hammer forming was used on titanium in much the same manner as on stainless steel or aluminum, except that forming was done hot. Blanks were heated, quickly located in cold Kirksite dies, and struck before they cooled appreciably.

Operators soon learned how to manipulate the rubber pads to develop proper forming without wrinkles. When minimizing hand forming became a primary objective, experiments showed that contours could be set by using a two-stage punch arrangement on the drop hammer. In this setup, one acts as a working punch, and the other as a coining or final stage punch. When the working punch is worn beyond usefulness, it is scrapped and replaced by the coining punch. A new final stage punch then is cast.

Improve contours by heated dies

The drop hammer also has been used for setting the contours of parts cold formed in crank, hydro and stretch presses. With relatively inexpensive Kirksite dies, the practice was found more economical than hand lineup. Steel inserts have been used extensively to prolong life of the Kirksite drop hammer dies.

Stretch forming hat and Z-sections is a good example of hot forming solely to reduce final lineup. Hundreds of parts previously were formed at room temperature on this equipment. But contours varied so widely that final lineup could be accomplished only by the drop hammer method. When form blocks on the equipment were supplied with cartridge-resistance heaters, uniformity of contours improved markedly.

Machine operators could often eliminate the effect of remaining strength variations by changing die temperature or stretching load. Hot stretching forming blocks normally are maintained at about 300°F.

As long as hand transfer from heating oven to dies and other hand adjustments are used, there is little value in determining optimum forming temperature. Forming over heated dies is another matter, and best fabricating temperature becomes most important.

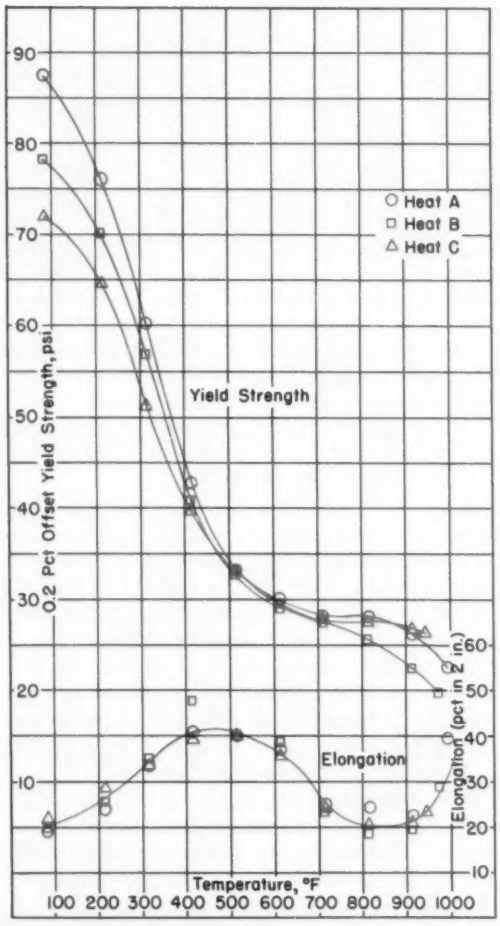


FIG. 2—(Top) Variable room temperature springback in titanium sheet is caused by disparity between yield strengths of different lots. From 500° to 600°F yield strengths are similar. Forming titanium in that temperature range enables accurate prediction of springback.

(Bottom) ABILITY of titanium to withstand forming pressures without tear or fracture is shown by percentage elongation curve. Peaks at 450° and again at 1000°F indicate two favorable forming zones.

Do it electrostatically—

Spray Diverse Products Without Changing Setup

RECIPROCATING disk process electrostatically sprays folding metal chairs at 3000 a shift.

◆ THREE styles of metal card tables and chairs are painted interchangeably on a recently installed electrostatic spray line without altering equipment settings. Need for varying paint spray angle to assure good coverage no longer exists. Rejects run less than 2½ pct, half that possible formerly. Production volume now handled in one shift would have required two under an older electrostatic spray setup.

Actual paint savings in coating Samsonite furniture exceed 35 pct. Labor required in production of card tables is down 45 pct at the Detroit plant of Shwayder Bros., Inc. Reciprocating disk-type Ransburg electrostatic spray equipment is employed in both Detroit and Pittsburgh operations.

Boosts quality

Paint and labor savings were realized and work quality improved when the Pittsburgh plant installed an electrostatic spray unit some time ago. In 1955, reciprocating disk apparatus replaced the earlier spray process.

Rejects from the newer line often are better than acceptable quality from the old electrostatic setup. Much of the quality improvement is attributed to the uniform thickness produced by the reciprocating disk.

At the first of two chair line stations in the firm's Detroit plant, a conveyor loops around one reciprocating disk sprayer. Paint is pumped from a central distributing system to the disk's center. It is spread by rotation evenly around edges.

High dc voltage is imposed on the disk, establishing an electrostatic field between it and the electrically grounded parts on the conveyor. The resulting electrostatic field attracts the atomized paint to the surrounding chairs.

Multiple strokes of the reciprocating disk apply a uniform coating from top to bottom of the work. As coated parts emerge from the first station, an indexer on the conveyor reverses the chairs. Painting of the opposite side in a second electrostatic spray station is identical to the first. Chairs are processed at 9 to 11 a minute.

Minor touchup, where required, is applied at this point. Chairs then go into an infrared oven for a 10-minute bake at 350° F.

Both Detroit and Pittsburgh operations have increased production, improved quality and achieved greater uniformity with electrostatic disk spraying. At Detroit, paint savings on chairs run 37½ pct. On card tables, paint costs are down 40 pct, and labor costs 45 pct.

Chairs are turned out at 3000 daily in the Pittsburgh plant. Paint savings there average 40 pct. It's estimated that the reciprocating disk process saves an additional 20 pct in labor over the earlier electrostatic spray method.

Less floor space is required for both finishing setups. Maintenance has been cut 80 pct or better. In Detroit, for example, spray booths previously scraped down once a week now are cleaned only every six weeks.

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New Technical Literature:

Catalogs and Bulletins

Gear boxes

A series of flexible, precision-made gear boxes for use in actuators, computers and small electronic components are described in detail in a new illustrated catalog sheet. Designated Series 145 and 167, the gear boxes covered in the sheet provide maximum torques from 150 oz. in. to 200 oz. in. with high efficiency and low backlash. They are designed for mounting directly to small electric motors and can be supplied with an input shaft if desired. Complete specifications are included in the catalog sheet. *Southwestern Industries, Inc.*

For free copy circle No. 1 on postcard, p. 109

FOR YOUR COPY

Many-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 109.

Plant maintenance

A new, illustrated catalog, describing a manufacturer's method of corrosion control, has just been issued. The catalog, for maintenance engineers, describes corrosion control in the operating plant. The various corrosion-resistant coatings systems manufactured by the company are outlined, as well as such additional service as guidance in choosing the proper protective coating, assistance in writing coating specifications, and on-the-job inspections during application. *Amercoat Corp.*

For free copy circle No. 2 on postcard, p. 109

Silicone products

A new 8-page bulletin describes a line of silicone rubber products. Applications described in the bulletin include molded and extruded parts for appliance, automotive and aircraft products as well as industrial seals. Inquiries for the bulletin are invited from manufacturers who have sealing or gasketing conditions involving high heat, or where flexibility of sealing material at low temperatures is required. *Garlock Packing Co.*

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Motors

Bulletin N-100-R is a 16-page, full-color catalog describing a line of small, light, cool running electric motors. Both totally enclosed fan-cooled and open drip-proof types of integral horsepower motors are detailed, with other enclosures and mounting variations covered. *Howell Motors.*

For free copy circle No. 4 on postcard, p. 109

Grinders

Precision surface grinders for tool room and production grinding operations are described in a new 24-page catalog. Among the models described in the new brochure are a tool room grinder now available in a considerably larger work area and a D-10 model, the new large size having a 10 in. by 30 in. work area. *The DoAll Co.*

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Toolroom Technique

The toolroom is the heart of WSM stamping business . . . where carefully engineered plans are translated into mechanical production, by the skill of men who know metals. This skill and experience counts when blueprint specifications call for accurate tolerances.

And . . . when it comes to speedy performance . . . over 100 presses, from 40 to 1000 tons capacity, offer diversified facilities at WSM for shaping all workable metals into light, heavy and deep drawn stampings.

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Weld equipment

Catalog No. 8155 describes a line of production welding equipment including positioners, turning rolls, head and tail stocks, longitudinal seamers, welding head manipulators for full or semiautomatic welding and special weld tooling. *Pandjiris Weldment Co.*

For free copy circle No. 6 on postcard, p. 109

Lubricators

Detailed description and operation of pull-type, semi-automatic lubricators are described in a 2-page, 2-color service instruction sheet now offered. The lubricators, designated as Types HIB and JIB, have a 1 pt and 2 pt reservoir capacity respectively, and are equipped with a pull handle. These one-shot lubricators are recommended for use on machines requiring closely controlled, but infrequent oil feed. *Bijur Lubricating Corp.*

For free copy circle No. 7 on postcard, p. 109

Respirators

Air line respirators are described in a new, 2-color catalog which illustrates the two basic types available, constant flow and demand flow, and the three facepieces which can be supplied, Dustfoe, Comfo Cushion and All-Vision. The respirators discussed are designed for protection in atmospheres not immediately harmful to life such as welding and cutting fumes, toxic dusts, paint spray vapors, and fumes from molten metals. *Mine Safety Appliances Co.*

For free copy circle No. 8 on postcard, p. 109

Laminations

The 7th Edition of "Transformer Laminations," which has been revised and expanded to 120 pages, is now being distributed. The book gives detailed information and drawings on 100 different standard lamination shapes made by the organization. Such items as direction of grain, count and weight of laminations, magnetic and mechanical dimensions, lamination die layout, as well as other important data is included. *Allegheny Ludlum Steel Corp.*

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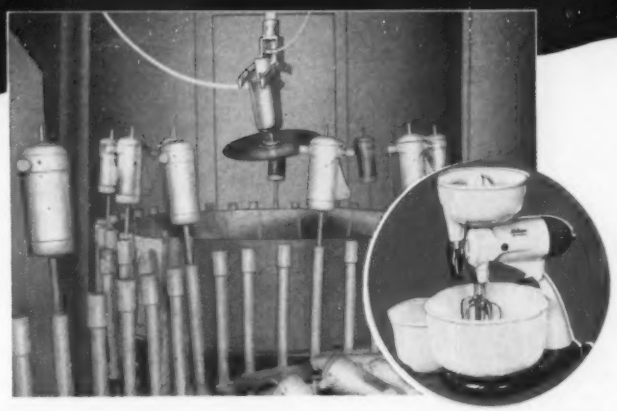
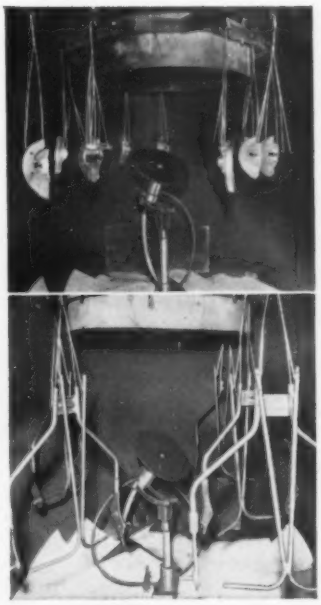
Sunbeam is particular about the uniform high quality finish on their products, so SUNBEAM relies on RANSBURG NO. 2 PROCESS Electrostatic Spray Painting



Along with improving the quality of the brilliant white finish on Mixmaster parts, an 80% paint savings was achieved when SUNBEAM switched from hand spray to RANSBURG Electrostatic Spray Painting



Protective clear lacquer is applied to upper saw guard (upper left) with RANSBURG NO. 2 PROCESS on this line in SUNBEAM's plant 2, Chicago. Other hardware items, including the Drillmaster and Sunbeam Sander are lacquer-coated electrostatically here. Lawn mower parts, such as the handles shown (lower left), the Rain King lawn sprinkler base, and the Sunbeam Fryer base also are painted efficiently with Ransburg No. 2 Process Electro-Spray.

Regardless of the type of product you manufacture, if it's painted—and if your production justifies conveyorized painting—you should look into the savings and improved quality which can be yours with one of the Ransburg Electrostatic Processes. May we tell you about complete Ransburg services, including the test painting of your products in our laboratories?

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Ransburg ELECTRO-COATING CORP.

Indianapolis 7, Indiana

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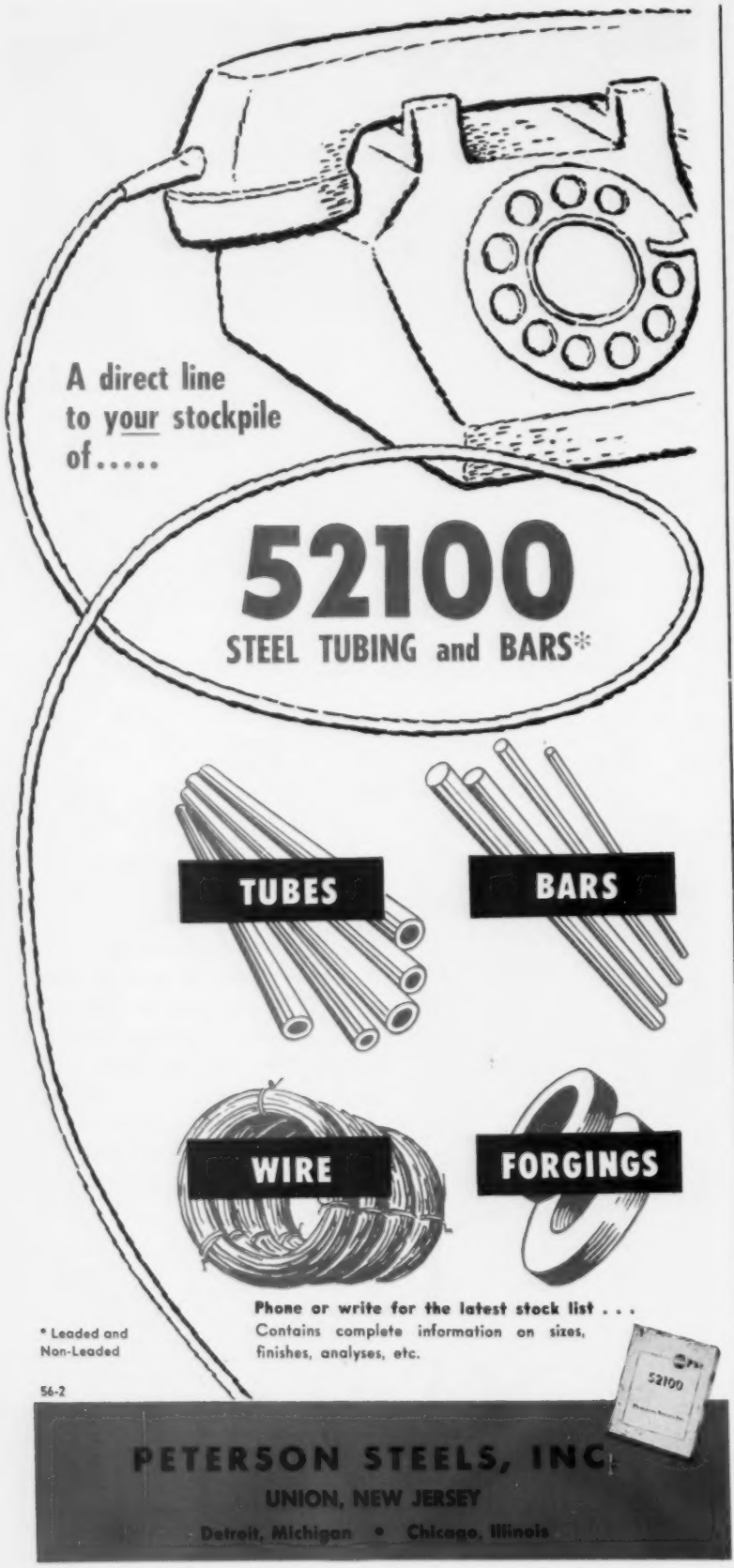


Crane power

Catalog No. 2021-A describes a line of Inverted-Y Electrification now being made available for application on all makes of cranes and runways. The booklet contains drawings and information necessary for ordering the aluminum Inverted-Y conductors, supports, and collectors for any normal application requiring current in amounts of 300 to 1000 amp. *The Cleveland Crane & Engineering Co.*

For free copy circle No. 10 on postcard, p. 109

Brass alloys

A new Technical Sales Bulletin is available on a very comprehensive series of powder metal brass alloys —Sintaloy "Z" brass alloys. The bulletin not only lists the chemical composition of each specific alloy, but highlights essential physical properties and characteristics as well. Important features of parts fabricated from each of these alloys are also stated. *Dixon Sintaloy Inc.*

For free copy circle No. 11 on postcard, p. 109

Molds

A folder describing molds for plastics and die casting dies includes a graphic description of actual case histories of routine and difficult molds for plastics. Photographs offer evidence of one firm's ability to offer injection molds, compression molds, plunger molds, transfer molds, plus engineering service for every plastic molding need. *Parker Stamp Works, Inc.*

For free copy circle No. 12 on postcard, p. 109

Portable driller

A portable drill press which taps, drills, reams and countersinks is described in an 8-page folder. Operating advantages are discussed with text and use of application photographs. *Guibert Steel Co.*

For free copy circle No. 13 on postcard, p. 109

Aluminum pigments

The properties of aluminum pigments (pastes and dry flake powders) and aluminum grain are detailed in an 8-page catalog. Specifications and typical uses are included in chart form. *Metals Disintegrating Co., Inc.*

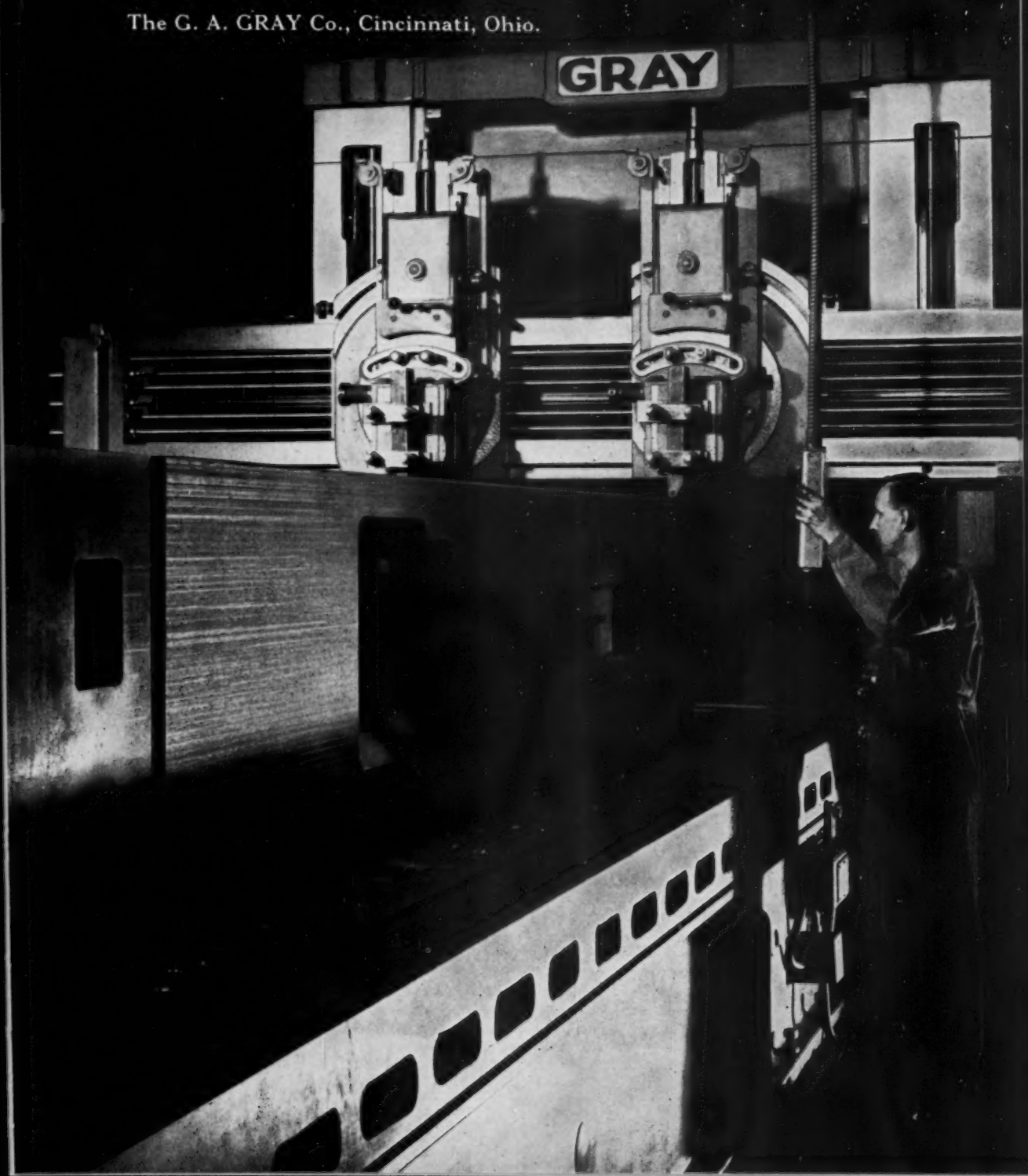
For free copy circle No. 14 on postcard, p. 109

Magnificent monster

The GRAY is recognized by machine shops throughout the world as the ultimate in planers. Built for high production with great precision, it combines more original engineering developments and production features than any other planer. It is in such demand that GRAY is the largest planer builder, further proof that

Quality doesn't cost . . . it pays.

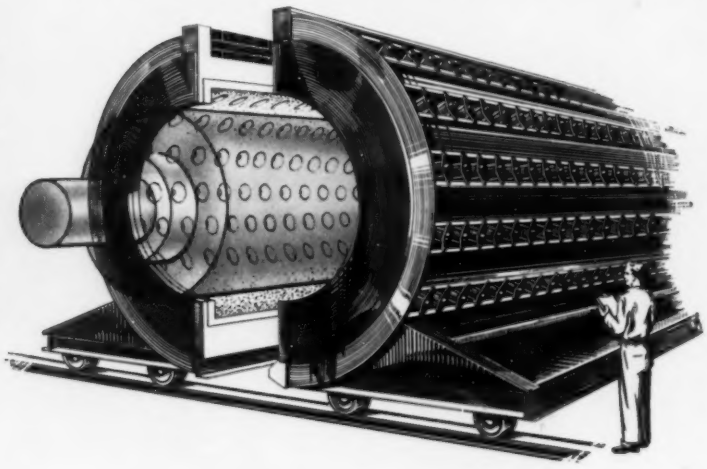
The G. A. GRAY Co., Cincinnati, Ohio.



VERTICAL or HORIZONTAL . . .

Rolls hardened 12 times faster

with SELAS Heat Processing



Whatever your preference . . . for vertical or horizontal handling of rolls . . . you get the same benefits from Selas Gradiation fast heating:

- Rolls are hardened in only a fraction of the time usually required. In recent production tests, involving 14-inch diameter rolls, heating time was reduced to 95 minutes . . . conventional practice has been 18 hours.
- The precise, controlled heat application enables a uniform hardenability pattern to be obtained.
- The shoulders of the roll are not affected.

Although custom-designed and built to your product requirements . . . each Gradiation roll-hardening furnace accommodates a wide range of roll sizes.

In heat treating, strip annealing, heating large steel sections, forging, brazing and other continuous operations, involving both ferrous and nonferrous metals . . . Selas Gradiation heating is the key to greater efficiency, higher production, improved product quality and reduced operating costs.

Our engineers will be glad to discuss how Selas Gradiation methods can be tailored to your heating needs. Address Dept. 12.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
DEVELOPMENT • DESIGN • CONSTRUCTION

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 104

Carbide drills

An engineering data sheet describes a new line of hollow carbide drills combining drilling and trepanning action for high speed production of precision holes from the solid in cast iron, aluminum and bronze. Discussed are speeds and feeds, drill construction, thrust, horsepower and machine tool requirements, as well as drill accuracy and life, plus suggestions on coolants and coolant handling equipment. *Star Cutter Co. For more information see article on page 87 of this issue.*

For free copy circle No. 15 on postcard

Continuous coil

Literature is available on a manufacturer's continuous length wire coils of 2000-3000 lb. catchweight which are designed to reduce down time, cut scrap loss and simplify wire handling. The coil is reportedly supplied in virtually any temper, analysis and size from 14 gage through ½ in. diam. inclusive. *Continental Steel Corp.*

For free copy circle No. 16 on postcard

Crane handbook

Now available to qualified engineers and others directly interested in crane specification is a 176-page handbook of data on electric traveling cranes. Seventeen sections cover such subjects as: terminology and classification, operating speeds, overhead clearances, elements of design, safety features, erection, operation and maintenance instruction. *Write, including title, on company letterhead to Whiting Corp., Advertising Dept., Harvey, Ill.*

For free copy circle No. 17 on postcard

Template portfolio

A new portfolio containing forty-eight 8½ x 11 in. tracing templates is announced. Prepared scale full size, the new templates are available for time and money saving tracings of all sizes of one firm's strap clamp assemblies, malleable and aluminum hand knobs, speed handles, speed bar knobs, revolving clamp assemblies and swing clamp assemblies. Printed on transparent tracing paper the designer or draftsman need only trace the proper size component for the particular design application. In addition, the portfolio contains an angle chart giving formulas for finding functions of angles and a chart showing decimal equivalents of standard drill sizes. *Available to designers and draftsmen by writing on company letterhead to Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland.*

For free copy circle No. 18 on postcard

Steel joists

An 8-page folder describes and pictures a company line of longspan steel joists. Complete specifications as well as loading tables are given. Information is included on a short delivery unit designed to meet early construction schedules. *Carew Steel Co.*

For free copy circle No. 19 on postcard

Chisel shank

Operating advantages and features of a pneumatic chisel shank of new design are described in a folder now available. User benefits such as no shank breakage, increased efficiency and ease of operation are cited for the units. *Delaware Tool Steel Corp.*

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THE IRON AGE
Post Office Box 77
Village Station
NEW YORK 14, N. Y.

Nuts

Publication of a new 16-page, 2-color Catalog (No. 55), covering a complete line of turned brass and aluminum nuts is announced. The illustrated brochure describes and gives specifications for the firm's standard hexagon nuts, open- and closed-end cap nuts and knurled thumb nuts as well as lighting fixture, spark plug and battery nuts. *Fischer Special Mfg. Co.*

For free copy circle No. 21 on postcard

Valves

Bulletin 401 describes a series of bronze, cast iron, and fabricated steel bellows-sealed vacuum valves. The two-color bulletin is complete with engineering drawings, cutaway and exploded views of the valves, and general dimension charts for the various sizes. *Kinney Mfg. Div., New York Air Brake Co.*

For free copy circle No. 22 on postcard

Lubrication

A new brochure showing the latest technical advances of a patented process of solid film lubrication is now available. Electrofilm, Inc., of North Hollywood, California, has incorporated in this literature results of recent laboratory and research efforts. Designed to show how product inhibits fretting corrosion, prevents galling and seizing, lubricates under high loads, high speeds, high and low temperatures from −100°F to +700°F (in some applications to 1100°F), and always produces dry, clean and dust free operation. *Electrofilm, Inc.*

For free copy circle No. 23 on postcard

Thermostat chart

A thermostat metals equivalence chart which compares the properties of thermostat metals produced by leading manufacturers is now available. Said to be the first chart of its kind, it is pocket-sized with specially rounded corners to prevent tearing in use. The chart was prepared by one manufacturer to provide a rapid means of comparing the properties of its thermostat metals to those of other companies. *American Silver Co.*

For free copy circle No. 24 on postcard

Spray painter

A new brochure on an automatic air motivated single spray decorating machine is now available. It includes illustrations and description of the Model SS2G portable spray painter, a new machine for either short or long runs which can be placed in most standard exhaust type spray booths. Described are methods where many different sizes and shapes of parts may be sprayed by rotation, for an even deposition of paint and true uniformity of coating. *Conforming Matrix Corp.*

For free copy circle No. 25 on postcard

Aircraft steels

Revised edition of an aircraft steels booklet gives condensed information on Army, Navy and Government aircraft steel specifications. Essential factors of the aeronautical specifications are shown, permitting use of the 68-page booklet as a guide when purchasing or specifying aircraft quality steels. Shown also are sizes, shapes and qualities of aircraft alloy and stainless steels, produced in accordance with aeronautical specifications, that are available for immediate shipment from warehouse stocks. *Joseph T. Ryerson & Son, Inc.*

For free copy circle No. 26 on postcard

Hydraulic valves

Catalog Section 261 deals with a line of solenoid operated, sub-plate mounted hydraulic valves. Sizes, operating and construction features, as well as optional features are covered. A 2-page chart gives piston design and flow operations for the units. *Rivett Lathe & Grinder, Inc.*

For free copy circle No. 27 on postcard

Wire

Wire manufacturer has prepared a detailed catalog on wire for industrial uses. Discussion is included on the advantages of the product for cold heating—covering the process, the machines, design factors, production operation, and wire characteristics. Space is given to cold headed screws, bolts and rivets as well as specialty uses of the wire. *Keystone Steel & Wire Co.*

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NEW YORK 14, N. Y.

FIRST CLASS PERMIT No. 36 (Sec. 34.9 P.L.&R.) New York, N. Y.

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"Alloys for the Furnaces." Agnes Potter Lowrie depicts the ingredients which give steel its special qualities: reddish manganese for deeper hardening; ice-white quartz for flux, flanked (left) by tungsten and (right) by chrome, corrosion preventives for special-purpose steels; dusky lead glistening with molybdenum which maintains hardness at high temperatures; and (bottom row) samples of nickel, molybdenum and chrome, vanadium, copper.

The Fine Art of Steel Making

Advances in metallurgy have given us *finer* steel than ever before, harder, finer-grained, more resistant to heat, friction, corrosion.

Advances in mechanics have given us *more* steel. Today's four-high mill, for instance, rolls more steel in a single shift than the old-time hand mill produced in a week.

Contributing mightily to more efficient production are equal improvements in the materials which smooth the process of steel making — Ironsides roll neck and roller bearing lubricants.

Roll neck shield, once applied by hand, is now supplied in liquid and semi-liquid form for continuous application by automatic pressure systems. Roll necks may be kept at constant temperature; the roller need not adjust his mill to maintain proper gauge.

More important, roll neck shield is formulated to the special needs of the individual user. For example, to compensate for local water and temperature conditions or to meet personal preferences of mill superintendents.

Roller bearing shield, an extreme pressure lubricant, has load-carrying capacity in excess of bearing manufacturers' standards, assuring a safety factor for peak loads. It carries the approval of all top bearing makers.
Today almost every major steel producer uses Ironsides lubricants. Our unique position is due to our ability to formulate for special applications and supply those formulas in any quantity.

We like tough problems; we've solved a lot of them. For example, Palmoshield, replacement for palm oil and most significant advance in lubrication since World War II. If you have a problem, we'd like to help lick it. A letter will summon one of our research engineers. The Ironsides Co., Columbus 16, Ohio.

SHIELD PRODUCTS

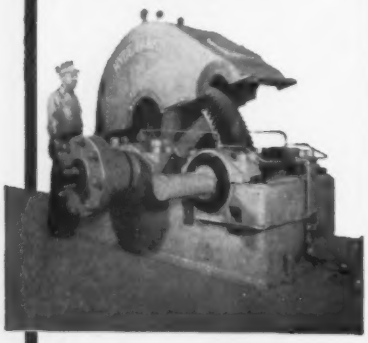
Ironsides

By the makers of Palmoshield • "the palm tree that grows in Ohio"

Hyde Park
RED CIRCLE Rolls ALLOY-CHILLED

Gray Iron Castings

Hyde Park Castings up to 80,000 pounds are sound, accurate and physically dependable.
Precision machining is done by skilled craftsmen in our modern machine shop.
Send your blue prints for quotation.



Mill Drive

Machine Castings
Lathe Beds
Housings
Pinion Housings
Mill Housings
Shoe Plates
Layout Plates
Surface Plates

For finer finish, long life and greater tonnage, specify Red Circle Rolls.

Hyde Park
FOUNDRY & MACHINE CO.
Hyde Park, Westmoreland County, Pa.
ROLLS
ROLLING MILL MACHINERY
GREY IRON CASTINGS

MACHINING: Cut Gears Better

High speed process shaves gear thin-tooth sections to provide more uniformity, accuracy of form, depth, width and concentricity . . . Units aid transmissions.

A high speed process described as producing uniform, accurate, thin-tooth sections in the flanks of spur gear teeth by a patented planetary shaving method has been developed by National Broach & Machine Co., Detroit. The process is carried out on a newly designed Model PSA-4 in. planetary gear shaving machine.

It was developed to meet the needs of transmission builders for a high-production method that would produce spur gear thin-tooth sections having uniformity; accuracy of form, depth, width and concentricity; a high quality surface finish; and a sharp step at the edges of the section. When a thin tooth section of this type is provided in a transmission clutch gear, tendencies of the transmission to slip out of gear are avoided.

Variety of Shapes Possible

A variety of thin-tooth section edge shapes can be produced by the new Red Ring process any of which may be required to suit the requirements for shifting of particular transmissions. The thin-tooth section can be produced in either one or both sides of all of the teeth of a spur gear by the process as desired. The profile of the thin-tooth section produced by the planetary shaving process closely approximates an involute form and is usually well within required tenths of a thousandth involute profile tolerances.

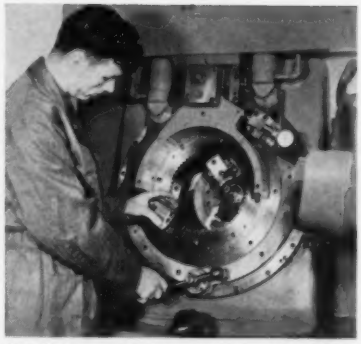
How Process Works

The Model PSA-4 in. Red Ring planetary shaver has a hardened and ground HSS cutter that resembles an internal spline. A gear, whose teeth are to be thinned in a given flank section, is mounted in a three-jaw gear tooth chuck in mesh with the cutter. The work gear rotates around the cutter centerline during the shaving process. Thus the gear is rotated about an axis in mesh with the cutter during the shaving operation in much the same manner that a planet gear runs with an internal gear in a planetary gear set.

Since the cutter has single cutting edges, which alternately thin first one side of all the teeth and then the other, a timed relationship is maintained between the gear and the cutter. This is achieved by locating the gear radially in the toothed chuck jaws and rotating the chuck about the cutter centerline with a master gear and internal gear assembly located in back of the cutter. If

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 109. Just indicate the page on which it appears. Be sure to note exactly the information wanted.



Variety of thin-tooth edge shapes are provided by shaver.

desired, the gear can be mounted on a work spindle and located radially with a single tooth locator.

At the loading position, the gear is located in such a manner that it is in backlash position with respect to each of the cutting edges of the planetary shaving cutter. When the automatic cutting cycle is initiated, the gear axis is rotated about the cutter centerline and the cutter is fed tangentially in increments, first in one direction, next back to backlash position, then in the opposite direction and finally back to backlash position for unloading.

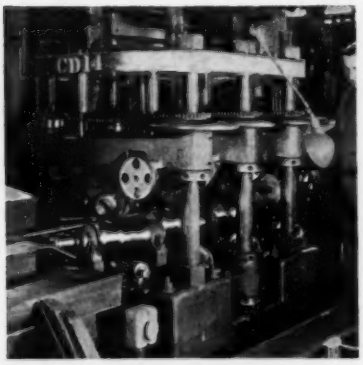
Straightening:

Rotary units straighten, temper copper tubing

Three models of one type of rotary straightener are helping maintain production schedules for straight copper tube with 3/16 to 3 in. OD. at Chase Brass & Copper Co., Cleveland.

Bows and bends are removed from the tubing by Mackintosh-Hemphill straighteners.

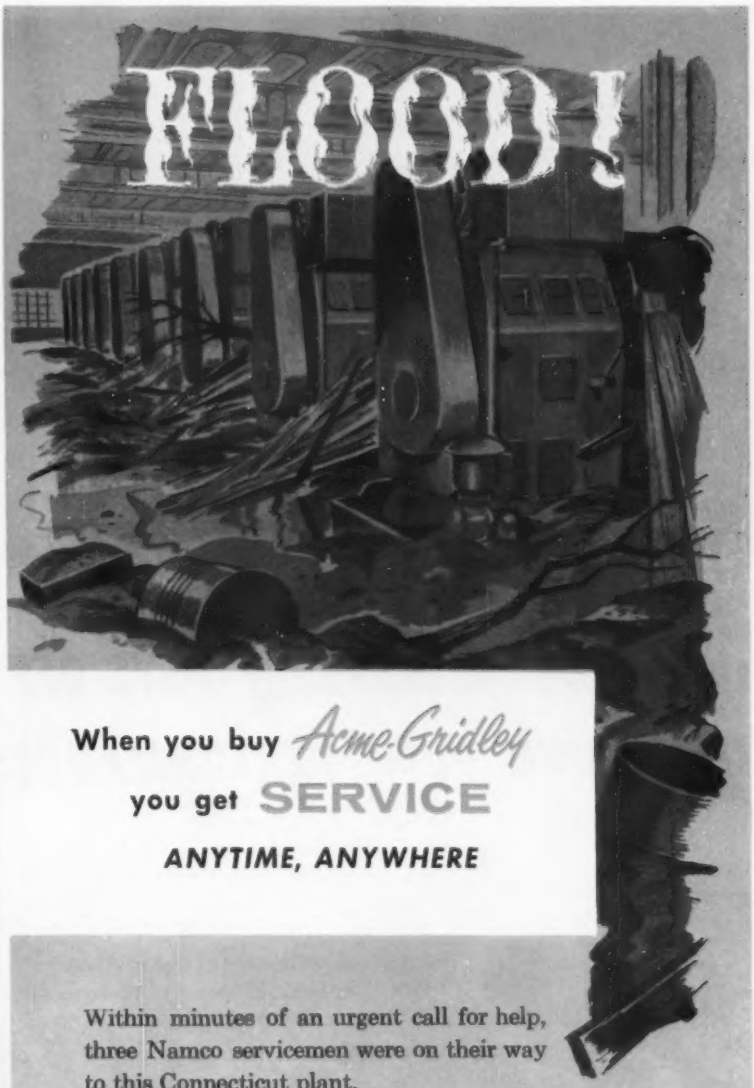
All three machines have helped eliminate the tie-up of draw



Variable drive gives choice of straightening, tempering speed.

benches for slow speed temper draws. The high speed tempering ability of the 6 power-driven rolls has proved desirable for tubes destined for air conditioning equipment where heat exchanger fins eventually will be attached.

One pass through any one of the machines gives tube lengths a



When you buy Acme-Gridley you get SERVICE ANYTIME, ANYWHERE

Within minutes of an urgent call for help, three Namco servicemen were on their way to this Connecticut plant.

Service without delay prevented extensive exposure damage, returned machines to production sooner.

Consider the importance of such "help-when-you-need-it" the next time you purchase automatic bar or chucking machines.

National Acme

The NAMCO nameplate on your machine assures service — in emergency or normal situations — when and where you need it.

THE NATIONAL ACME COMPANY • 175 East 131st Street, Cleveland 8, Ohio

rigidity to facilitate threading through holes in fins. Yet the temper does not excessively harden the tube to cause splitting when mechanically or hydraulically expanded for fin contact and soldering.

All three machines are equipped with variable speed drives to allow choice of straightening or tempering speed to suit the diameter and type of the tube, and in accordance with lengths which vary from 2 to 30 ft. The machines are the product of the Macintosh-Hemphill Div., E. W. Bliss Co.

Inspection:

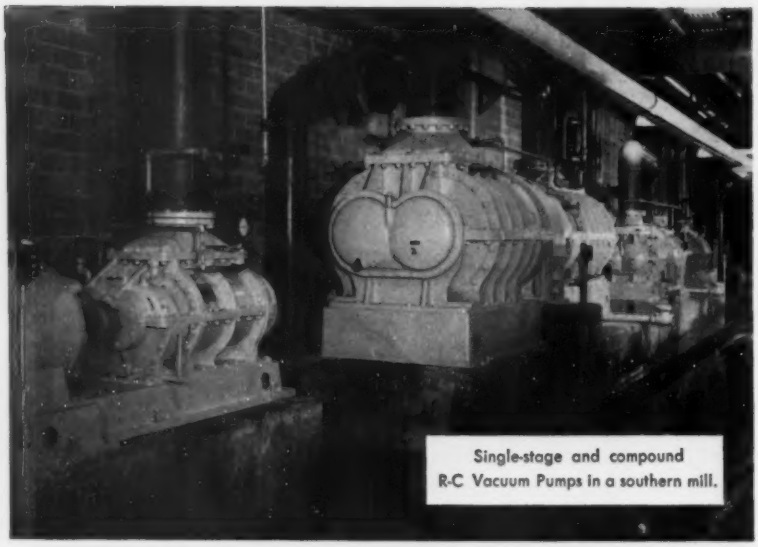
Magnetic particle device tests without electric.

A new magnetic particle inspection device designed to require no electrical power and reliably find cracks in magnetic parts or members is now available. The unit, called the YM-5, is manufactured by the Magnaflux Corp., Chicago.

Magnetic particle inspection on bearing support.

Since electric arcing is impossible, the YM-5 is planned to make practical the inspection of critical parts or welds in hazardous areas with no delay or stop in operations before performing certain preventive maintenance inspections.

Flight line inspection of steel aircraft propellers and other critical parts is reported to be performed quickly and easily with the YM-5. It eliminates the need for disassembly, heavy equipment, and electric power, and greatly increases the efficiency of these regular inspections.



R-C *plur-ability* PAYS OFF
IN VACUUM PUMP PERFORMANCE

For moving gas or air, call on R-C plur-ability

Centrifugal and Rotary Positive Blowers, Gas Pumps and Exhausters

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Spiraxial® Compressors

• • •

Positive Displacement Vacuum Pumps and Meters

• • •

Inert Gas Generators

• • •

Send for details and informative bulletins.

Important operating factors, which add up to *R-C plur-ability*, account for the rapidly increasing use of Roots-Connersville Positive Displacement Vacuum Pumps for industrial processing.

- **Reduced horsepower at higher speeds** (600 rpm and up) creates power savings up to 25% and far lower first cost of motors.
- **Single-stage or multi-stage units** in size ranges for all requirements.
- **Long-time reliability and low maintenance** no internal contacts or excessive wear. Almost complete freedom from down-time and maintenance.
- **Small floor space** less expensive foundations. Lower cost per cubic foot of capacity. Adaptable to crowded space.
- **Minimum sealing water** from 4 gpm. to 40 gpm. Efficiencies not affected by changes in water temperature.

To see how leading industrial users make a profit from *R-C plur-ability*, write for details, in Bulletin 50-B-13.

ROOTS-CONNERSVILLE BLOWER
A DIVISION OF DRESSER INDUSTRIES, INC.
256 Ohio Avenue, Connersville, Indiana. In Canada—629 Adelaide St. W, Toronto, Ont.

Methods:

Electronic system permits crane control from floor.

A new electronic system, designed to provide remote control of traveling cranes from the plant floor, requires only carrier current over existing power rails. Installation is described by the manufacturer, Femco, Inc., Irwin, Pa., as simple for any crane or similar device now in use or in new construction. No additional power rails are required.

With the control, an operator can raise or lower the hoist (5 positions), position the trolley forward or reverse (5 positions), travel forward or reverse (3 positions) and can energize or turn off the magnet, all from the floor. As many as eight cranes can be controlled on one power circuit by use of different carrier frequencies and one operator can operate more than one crane. By use of two control panels, a crane can be loaded by one man and then sent to the other end of its runway where another man can unload it and send it back.

Relays Used

In operation, high-speed synchronous relays on crane and floor panel operate whenever levers are moved. Carrier frequency on each step is shifted down to a lower frequency for an "off" control and up to a higher frequency for an "on" control.

Whatever control is sent during one operating cycle is stored by a "sealing-in" relay until changed by another operating cycle. The small relays which operate in a few milliseconds are repeated by contactor type relays for the actual control. An emergency stop switch is provided to cut off the carrier and open the control contactors if the relay system or carrier link fails at any time.

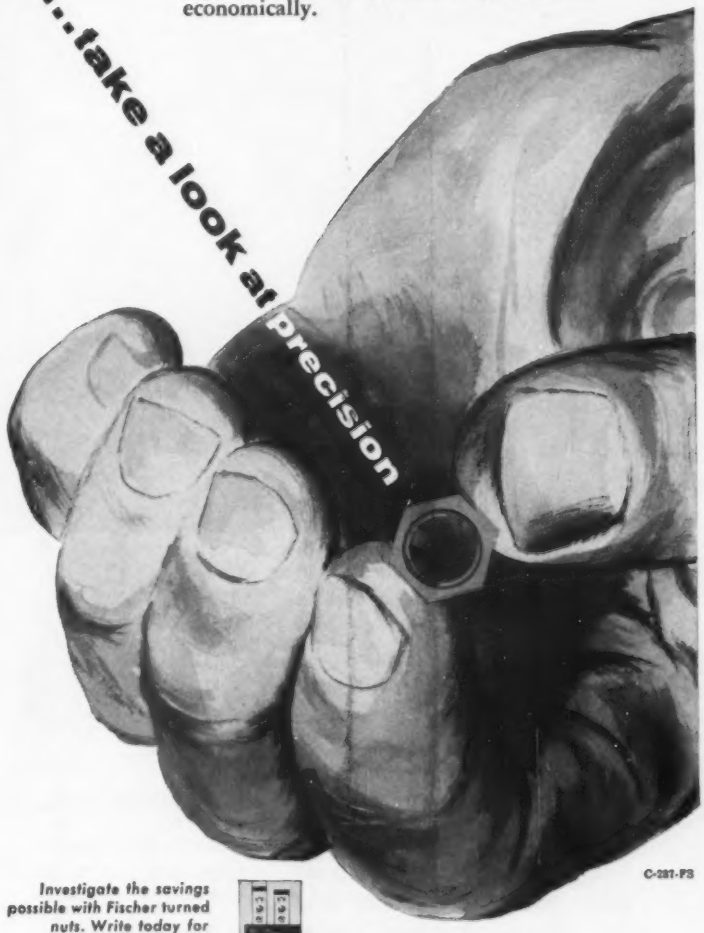
The floor control panel may be in a permanent location or may be placed on a cart for portability from one to another power receptacle.

Because they are produced by *turning*, rather than by less accurate methods, Fischer brass and aluminum nuts set new standards of precision and quality that speed assembly operations . . . reduce costs. Uniformly accurate, Fischer nuts are tapped square with the face to Class 2 tolerances . . . countersunk on both sides . . . burrless . . . cleaned and degreased before delivery.

You pay no premium for Fischer *precision-turned* nuts . . . they're priced no higher than those made by less exact methods.

Prompt delivery of all standard types and sizes is assured by large factory stocks . . . "specials" can be produced quickly and economically.

HERE . . . take a look at precision



C-231-FS

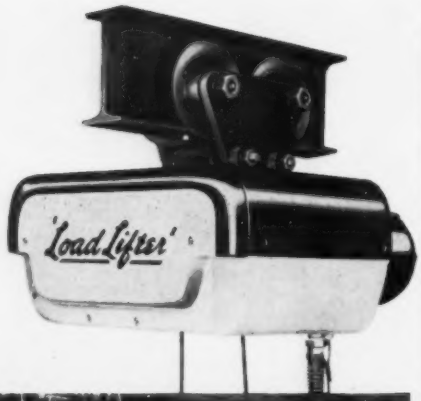
Investigate the savings possible with Fischer turned nuts. Write today for Catalog No. 55.

Fischer
SPECIAL MFG. CO.
445 Morgan Street
Cincinnati 6, Ohio

TURNED NUTS
Fischer
SPECIAL MFG. CO.
CINCINNATI OHIO
SINCE 1908

JUST RIGHT

FOR LOW-COST PRODUCTION LIFTING



It takes fast hoisting to keep work moving to and from benches, machines and stock piles on schedule. The Series "600" 'Load Lifter' Electric Hoist operates at 30 FPM to lift ½-ton loads. It has safe 24-volt push-button control to start and stop this fast hoisting instantly. Accurate spotting is easy. The flexible wire rope permits nominal side lifts with complete safety for man, load and hoist.

If your production suffers from slow load handling, learn how the Series "600" 'Load Lifter' Electric Hoist can improve your timetable and cut your costs. Capacities: ½ and 1 ton. All types of suspension. Get details from your "Shaw-Box" Distributor or write us for Bulletin 408.

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

Plastics:

New laminate developed for bonding to metals.

A new fluorocarbon plastic laminate with high temperature and extreme chemical resistance has been developed for adhesive-bonding to almost any contoured surface. Vessels ranging from rectangular plating tanks to complex reactors involving flanged pipe connections and dished heads, have been lined throughout with the material which was developed by the M. W. Kellogg Co.

A company spokesman states that the development of this material gives designers a new lining for tanks, vessels, reactors, drums, pails, pipe, chutes, hoppers, fume hoods, and ducts. Other applications envisioned include

Laminate cold formed into bead and lugs of pail cover.

surfacing for laboratory bench tops, chemical plant floors, foundry parting boards, concrete forms, conveyor belting, resin casting forms, and foam rubber molds. It is also expected that, as surfacing, the laminate will considerably broaden the effective application range of reinforced plastic or honeycomb structures.

Advantages Cited

Fabrication-wise, the laminate sheets (36 in. x 46 in.) can be handled easily. They can be cut with a knife or tailor's shears, and can be either cold or hot formed to flat surfaces or those with compound curvatures. Their other properties parallel those of the plastic with which they are

produced, including: high resistance to temperatures approaching 400°F and low temperature flexibility; excellent resistance to chemicals — alkalies, mineral acids, strong oxidizing acids, and solvents; low permeability to moisture, organic and inorganic liquids and vapors; high abrasion resistance and tensile strength; low cold flow and high impact resistance; high dielectric strength and electrical resistivity; and non-toxic and non-sticking characteristics.

The sheets are produced by the Garlock Packing Co., Palmyra, New York, and the U. S. Gasket Co., Camden, New Jersey.

Outside chemical storage tanks, ranging up to 1000 gallons in capacity, are now protected against the corrosive products they contain by these protective coatings. Applied by spray, dip or spread coating, they are fused by heat into a tough, impervious coating —firmly bonded to the surface on which they are applied, and providing a chemical and temperature resistant surface that is anti-sticking and self-cleaning.

Metallurgy:

Powder metallurgy provides better bushing.

Powder metallurgy fabrication is described as the most economical way to make an overtravel safety bushing for Revere Camera Co.'s new automatic slide projector. Working in conjunction with a safety spring, the bushing's function is to prevent damage to the mechanism by relieving pressure from imperfect or damaged slides.

Made of reduced-oxide iron powder supplied by Plastic Metals Div., National-U. S. Radiator Corp., the bushing reportedly has an operating life equal to that of the projector. It also provides high corrosion resistance and excellent bearing properties. The porous structure of the part permits impregnation of the pores with a molybdenum sulphide type

need a finish
that blocks corrosion by itself—or under paint? specify IRIDITE

You can solve any problem of non-ferrous finishing . . . maximum corrosion protection . . . sparkling clear or colored decorative finishes, firm and lasting base for paint . . . with these two words—"specify Iridite". For example—

- **ON ZINC AND CADMIUM** you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.
- **ON COPPER . . .** Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.
- **ON ALUMINUM** Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.
- **ON MAGNESIUM** Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

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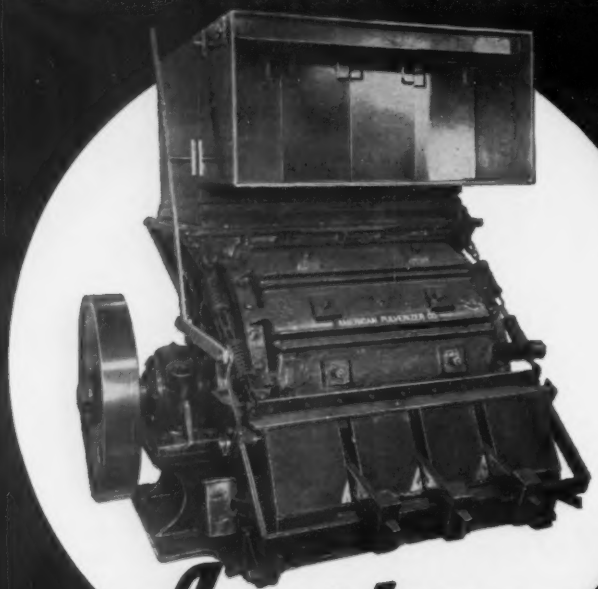
Change Metal Turnings Waste into More Profitable Shoveling CHIPS



American METAL TURNINGS CRUSHERS

No progressive, profit-conscious company—who produces 10 or more tons of metal turnings per month—can afford to ignore the profit potential of a modern chip salvage system . . . with an American Metal Turnings Crusher at the core.

American installation profits include: $4 more per ton for chips than for machine turnings; up to 50 gallons per ton in cutting oil recovery; 75% less storage; easier, faster handling.

How many profit dollars are you losing under present operations? If, for example, you're currently producing 20 tons of turnings a month . . .

THIS COULD BE YOUR PROFIT STORY FOR NEXT YEAR!

240 Tons Metal Turnings per Year (20 tons/month at $4 extra per ton)	$ 960.00
6,000 Gallons Recovered Cutting Oil at 30¢/Gal. (50 gals. per ton x 240 tons = 12,000 gals. Half of this, 6,000 gals., can be credited to use of chips instead of turnings in reclamation)	$1,800.00
Estimated Savings in Manpower, Storage, Tools, Maintenance, Freight, etc.	$ 300.00
TOTAL GROSS PROFIT	$3,060.00

American PULVERIZER COMPANY

Designers and Manufacturers of Ring Crushers and Pulverizers

WRITE for Metal Turnings Crusher Bulletin.

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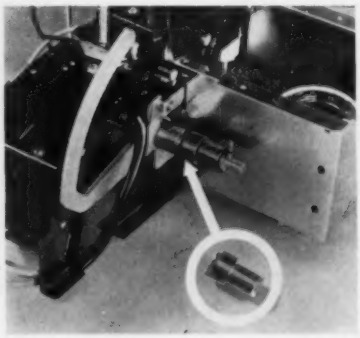
lubricant for lifetime service.

In cooperation with Chicago Powdered Metal Products Co., which makes the bushings, Revere engineers investigated the benefits promised by powder metallurgy. They gave sample bushings a thorough life test before deciding on the new method of fabrication.



Reduced-oxide iron powder part is economical, long wearing.

Every expectation was realized —the iron powder bushing proved equal to those previously used, with the added advantage that it could be made at one-fifth the cost. The bushing's offset flanged shape with a shoulder on one end and lugs on the other, plus a shaft hole, made previous machining operations costly.

Non-Ferrous:

Pre-enameling process develops better aluminum coating.

A time and cost-cutting pre-enameling process for porcelain enameled aluminum is announced by Aluminum Co. of America.

Known as the Alcoa R-100 Process, the patented chemical treatment is described as simple, inexpensive and well suited to a continuous enameling operation. The new conditioning treatment reportedly will eliminate multiple chemical baths and the prefiring operation, formerly necessary to insure controlled surface conditions.

When applied to aluminum, the R-100 process is said to produce a uniform, conditioned surface in

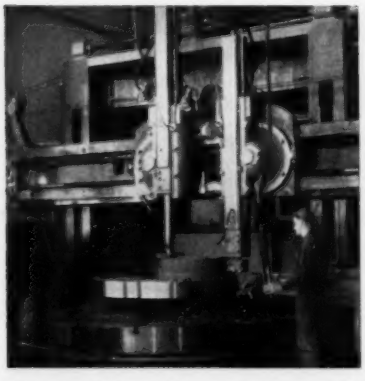
one step. The metal then readily accepts a porcelain coating. The process has passed laboratory tests and substantial savings in manufacturing costs are anticipated from its use.

The patented process is expected to enhance the use of colorful porcelain enameled aluminum on buildings and elsewhere.

Machining:

Rough turn cutting speeded with insert.

A metal removal speed in excess of 93 cu ipm is being obtained on a boring mill which employs a heavy duty cutting tool with a turnover insert to rough turn an eccentric cast steel gear. This metal working task was considered a rugged steel cutting assignment by a manufacturer of heavy machine tool equipment, according to Kennametal, Inc., Latrobe, Pa., manufacturer of the cutting insert.



Heavy duty cutter speeds rough turning of gear.

The 72 by 8½ in. gear had severe sand inclusions and torch-cut casting gates. Such irregularities on the outside diameter made it necessary to remove from 2½ to 3½ in. of steel in machining to finish size.

Sixteen Roughing Cuts

Two rough cuts were made with the insert before it was indexed to a new cutting edge. Since four cutting points are available on each side of the insert—two turning and two facing—16 roughing cuts were made. The insert was then replaced,

WHAT'S THE FASTEST WAY TO CLEAN METAL?
See page 11
WHAT'S THE MOST ECONOMICAL WAY?
See page 9
Some good things to know about Metal Cleaning
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- Applying iron phosphate coatings in preparation for painting
- Applying zinc phosphate coatings
- Cleaning, removing rust and conditioning for painting in one operation
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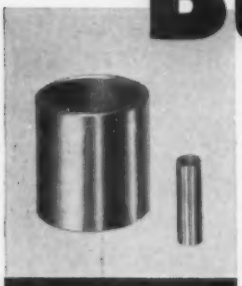

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The Bunting line of Sintered Powdered Bronze bearings provides a wide range of sizes including all A.S.T.M. recommended sizes, tolerances and standards. The composition of the Bunting Sintered Bronze Stock line is copper 90%, tin 10%.

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eliminating expensive regrinding.

The user reported that despite the extremely uneven surface of the steel gear, the rough turning of its circumference was achieved economically and efficiently. The sfm is reported as 300—feed at 0.062 ipm and a ½ in. maximum depth of cut.

Heat Treating:

Tape resistor curing uses liquid exchange.

A continuous furnace for curing tape resistors has been designed and constructed under the direction of the National Bureau of Standards. The furnace uses a liquid heat exchange medium to achieve highly stable temperature control with the curing temperature held to ± 1 degree C on long-term operations. While built as a laboratory unit, the furnace is well suited for a production line facility. It processes each resistor identically and makes possible the manufacture of closer-tolerance tape resistors for module wafers or printed circuit plates.

Designed for Navy Needs

The furnace was designed primarily to meet the needs of the Mechanized Production of Electronics Program (MPE) sponsored by the Navy Bureau of Aeronautics. It is stated that it should be equally valuable for firing or annealing other materials where time and temperature must be accurately controlled and where a repeatable cycle of temperature rise and fall on entering and leaving the furnace is important.

Firing Fixes Resistance

The NBS self-adhesive tape resistor consists of a carbon formulation applied to an asbestos-paper tape base. The composition of the formulation and the variety of the carbon determine the resistance value since the resistors are cut to the same size—0.130 in. by 0.300 in. After the resistor has been placed in a printed circuit, it must be cured to fix its resistance value.

As many as four resistors, mounted on a ceramic plate bearing

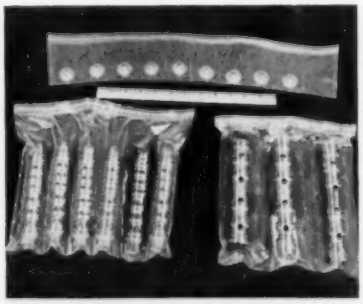
a fired silver conductor pattern, are cured by placing in an oven and heating to a predetermined temperature for a prescribed period of time. Because of the different carbon formulations, each resistor may require different temperature and time curing schedules. Since it is clearly impossible to cure the resistors in the assembled circuit according to individual schedules, a compromise was adopted for curing all resistors. This compromise schedule, based on results obtained from experiments performed on over 6000 tape resistor specimens, was a governing factor in the design of this continuous furnace.

Materials:

Reusable polyethylene bags provide handy part storage

A new type of reusable bag with a self-locking closure is designed so small industrial parts cost less to store and can be handled efficiently. Both the film bag and the closure, developed by Polyfab Company, Los Angeles, are made of Bakelite polyethylene.

Light thumbnail pressure locks edge of the new closure together, sealing the contents in the tough film bag against moisture, air and dirt. Edges of the closure are easily pried apart to open the bag, and can be relocked again and again. Contents, including tags or part numbers, are clearly visible through the transparent film to facilitate sorting and inventories.

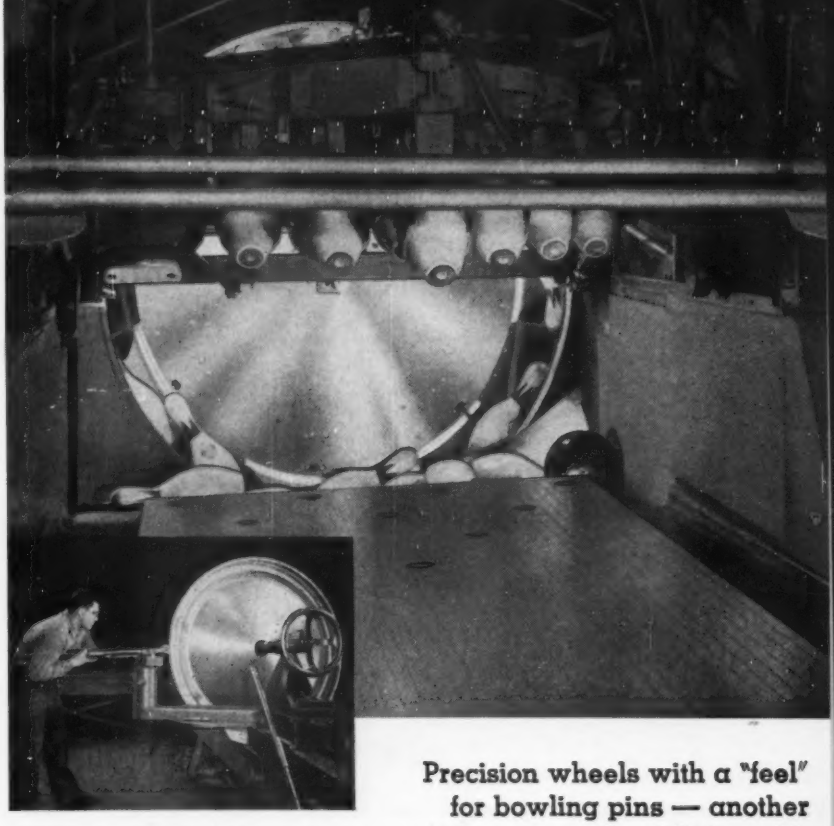


Parts are clearly visible for sorting and inventory work.

Reusable new film bags are used in place of non-transparent pouches and wraps sealed with pressure-sensitive tape. Produced

Spincraft did it for AMF . . .

Spincraft can do it for you!



NINE DIFFERENT OPERATIONS—
Spinning and forming tolerances to .031"

On each 5-ft. wheel, Spincraft assumed 100% fabricating responsibility: deep draw, spin, punch, blank, stamp and form, pantograph (chamfer), surface finish, drill, rivet, carton and ship. Operator (above) is spinning the ⅛-in. thick sheet of tough 52S aluminum alloy. Cross-section of basic wheel (right) shows unusual contour requirements. Raised segments are ⅛-in. cold rolled steel.

Write for Spincraft data book. If you have a specific problem, tell us about it — no obligation.

Precision wheels with a "feel" for bowling pins — another example of Spincraft's fabricating skill

By setting pins faster, American Machine and Foundry's automatic pin spotter gives more bowlers more opportunities for better scores! Spincraft is proud to have successfully fabricated a key component of the AMF pin spotter. It's the large-diameter pin elevator wheel — our solution to a difficult production problem for this well-known manufacturer.

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in shapes and sizes to fit different parts, these bags are also made in multiple-pouch form to hold a number of parts separated by sealed partitions to prevent contact between them. Using Bakelite polyethylene, Durethene Corp., Chicago, extrudes the film, and FlexiGrip, Inc., New York, makes the closures for these film bags in which Douglas Aircraft Co., Inc., El Segundo, Calif., stores small parts.

Testing:

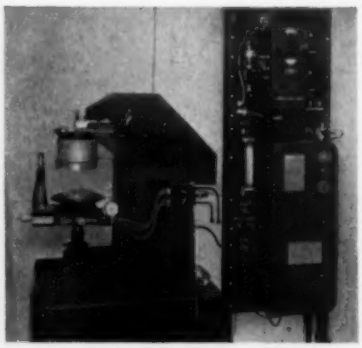
Unit measures micro-hardness at high temperatures.

Micro-hardness testing of very thin films at elevated temperatures has reportedly become more practical using a machine developed by Comstock & Wescott, Inc., Cambridge, Mass.

The tester is described as permitting making indentations on a test specimen with an accuracy comparable with that obtained with other units at room temperature. The instrument was built for the United States Arsenal laboratory at Watertown, Mass.

Problem Defined

Previously, limitations on hot-hardness testers have been either that they were not capable of the light loads required for micro-hardness testing or that they lacked means of placing the indentation in a desired location with sufficient accuracy.



Furnace is incorporated in micro-hardness tester.

About the best that could be done was to locate the indentation within 0.008 in. of a predetermined point. This was entirely inadequate for the intended purpose, which was to measure the hardness of cross sections of coatings which might be only 0.0005 in. wide.

Small Indent Sought

Several things were considered in the design. If the tester was to serve its intended purpose, the indentation had to be small enough to be well within the boundaries of the zone to be measured — otherwise readings would be influenced by the hardness of adjacent material which might be different.

This requirement dictated both the load range to be covered and the shape of the indenter. A range of from 10 to 100 g was considered suitable for most metals using temperatures in the range of 500°F-1250°F.

The Knoop indenter, which makes an indentation whose length is roughly seven times greater than its width, was considered best suited for testing cross sections of thin coatings. A further requirement was that the specimen had to be protected against oxidation if true readings were to be obtained. This necessitated the use of an extremely dry atmosphere continually passing through the furnace.

The comparatively light loads to be employed meant that the effect of friction and also the upward force exerted on the indenter by the pressure of the furnace had to be reduced to a minimum.

This was accomplished by having a clearance between the indenter rod and the furnace opening through which the reducing gas, at a very low pressure, escaped from the furnace.

The requirements as to accuracy of location meant, first, that the specimen had to be held in alignment on the anvil and, second, that lateral displacement, due to thermal expansion of the heated components of the furnace, had to be minimized.

A HEAD START IN STEEL SHOT QUALITY

Pioneered in 1948, and backed by over 60 years' experience in the manufacture of abrasives, Tru-Steel Shot was the original High-Carbon Fully Heat-Treated Steel Shot of Tool Steel Quality!

Tru-Steel, and only Tru-Steel, has the head start in experience, in manufacturing know-how, in years of solving steel shot blasting problems!

Every heat of Tru-Steel is laboratory tested and controlled to the exacting standards of fine steel making!

Only in Tru-Steel are found the combined characteristics that have been sought for years in metal abrasives — super toughness for resistance to breakage and proper hardness for fast, thorough surface-bright cleaning.

And Tru-Steel is now packaged in 50-lb. double burlap bags — the finest packaging ever devised for metal abrasives — lighter, easier to handle, easier to stack, not slippery like slick, hard-surfaced cardboard cartons.

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STEEL SHOT PRODUCERS, Inc.
Butler, Pa.
Subsidiary of Pittsburgh Crushed Steel Co.
Pittsburgh 1, Pa.

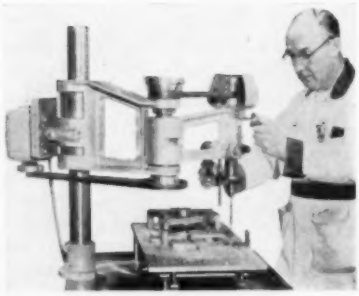
Sold and recommended by
Pangborn Corporation, Hagerstown, Md.

Tapping:

Jointed-arm drill reduces work time by 86 pct.

A jointed-arm radial drilling machine, designed and manufactured by the Hill Machine Co., Rockford, Illinois, is reported as reducing production time by 86 pct in comparison with a conventional set-up. In addition, it made a substantial reduction in tool breakage.

The piece machined was a complex aluminum alloy aircraft part into which 119 holes, ranging in size from #50 to ¼ in., were to be drilled from the top, bottom, and one end. Of these holes, 105 were tapped, the threads ranging from #2-56 to ¼ in.-20. A large number of the holes were bottom-drilled and tapped, the balance were through holes.



Jointed-arm drill cuts work moves from 224 to 3.

Only 3 Moves

Three jigs were used, the one for the top being shown in the picture. In an ordinary set-up, the jig would have to be moved for each hole, a total of 224 moves. In this arrangement, the work was moved only 3 times.

In all, 37,800 holes were tapped without breaking a tap. Of this number, 12,240 were tapped #2-56, ½ in. deep.

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Bonding:

Plastic-clad-metal gives strength with lightness.

While hydraulic pistons, particularly for heavy-duty application, are usually heavy pieces of equipment a new material, comprising a covering of thermosetting phenolic laminate bonded to a base of 24ST4 aluminum, points the way to units suitable for heavy-duty service that are also light in weight.

This light-weight piston design was developed for the Cleveland Pneumatic Tool Co. by the Synthane Corp. of Oaks, Penna., a manufacturer and fabricator of thermosetting laminated plastics for industry for a shock absorbing strut on an aircraft landing gear.

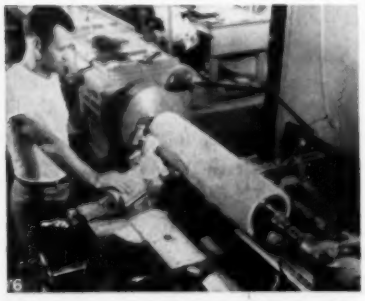
To stand up under landing blows, the pistons used in these units must be mechanically strong, shock resistant, impervious to oils and indifferent to sharp temperature changes that often range from below freezing in the air to the blistering heat of a paved runway. But the most crit-

ical requirement of all is that metal-to-metal contact between piston and cylinder be avoided to prevent the piston "seizing" inside the cylinder due to effect of weather or hydraulic oil on the metals.

To solve this problem, laminated plastic was joined with aluminum. The combination consists of specified thicknesses of laminated plastic material permanently bonded to cores of 24ST4 aluminum tubes of various diameters. A series of exacting machining operations converts the laminate-covered tubing to piston head bearings for use in the shock-absorbing units of the landing gear.

Production Described

Synthane Corporation begins the production of the piston heads by knurling a 38-in. long aluminum tube for its entire length. This machining operation produces a roughened surface comprising thousands of tiny ridges and knobs. These ridges provide the necessary anchor for bonding the laminate outer covering so firmly to the metal that, in effect, the two are permanently fused into one material.



After oven curing, cylinder is turned to exact diam.

The covering itself is a continuous length of specially treated fine-weave cotton fabric thoroughly impregnated with a phenolic resin. As the fabric passes over heated pressure rollers to be wrapped around the aluminum tube, the resin softens and the chemical process of polymerization takes place.

This fuses the individual layers

NEW DESIGN

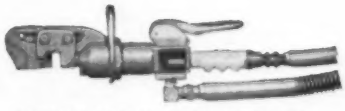
MANCO Hydraulic Guillotine®

WIRE AND ROD CUTTERS

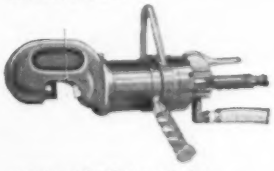
Big Capacity

FAST · EASY TO USE

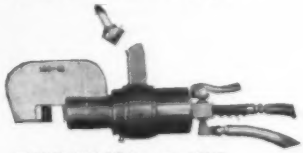
REENGINEERED for MINIMUM MAINTENANCE



MODEL MC 210 Capacity ½" High speed . . . ½ second per cut for steel rod to ½". Full swivel action.



MODEL MC 35 Capacity 1" Cuts high carbon material including reinforcing rod and heat treated chain to 1" diameter in 1¼ seconds per cut.



MODEL MC 65 Capacity 1¼" Cuts 1¼" diameter steel in 2 seconds per cut. Can be modified to cut 1½" diameter aluminum.

Big Time and Money Saver for Rod Mills and Users of Wire and Rod

Ideal for production cutting, trimming off cobbled ends, taking test samples and splitting bundles on docks.

Manco has completely redesigned the Guillotine line of wire and rod cutters now used by major rod mills throughout the world. These new Manco Guillotine units give high efficiency, heavy duty performance, with a 75% slash in tool maintenance costs.

New Interchangeable Blade and Anvil

Interchangeable blade and anvil means wear points can be reversed for virtually double life. Three blade styles for various cutting requirements. There is a new simplified valve design with hardened and ground parts for longer life. Also, new Meehanite piston with large bearing surface and a new piston seal assembly that permits quick replacement.

These Guillotine units powered by Manco Hi-Thrust Electric Hydraulic Pumps

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IA-2B

MANCO MFG. CO., Bradley, Illinois

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☐ Catalog of new Guillotine Wire and Rod Cutters.

☐ Trade-in information on Guillotine model(s).....

.....

Name .....

Firm .....

City .....Zone.....State.....

into a strong, solid mass that cannot be resoftened or reshaped. When sufficient layers of fabric have been wrapped around the tube to build it up to a point slightly beyond the required wall thickness, the tube is oven-cured to complete polymerization.

The laminate wrapper is then machined to the proper outside dimension, following which the tube is cut to the specified lengths. Synthane then performs more than a dozen machining operations on the laminate - aluminum combination to produce each piston head.

Machining:

Plates for wind tunnel provide difficult job.

The job of building the flexible nozzle of a transonic wind tunnel at the U. S. Air Force's Arnold Engineering Development Center, Tullahoma, Tenn., was given to Baldwin-Lima-Hamilton Corp., Philadelphia, Pa. It consisted of machining large unwieldy flexible plates with a thickness of 0.850 in. to an actual thickness tolerance of ±0.030 in., with a transverse flatness of ±0.031 in. maximum with variation to be gradual enough not to exceed 0.003 in. per inch and with the longitudinal flatness to be ±0.019 in. with variation from an 8 ft straightedge not to exceed 0.001 in. per inch.

The four plates are each 8 ft wide and 57 ft long and, when completed, will form the flexible sides of a variable type nozzle used to vary and control air flow in the propulsion wind tunnel. They are made of U.S.S. Carilloy T-1 steel for high ductility and tensile strength, having a yield strength of 90,000 lb. per sq in. minimum, and an ultimate tensile strength of 105,000 lb. per sq in.

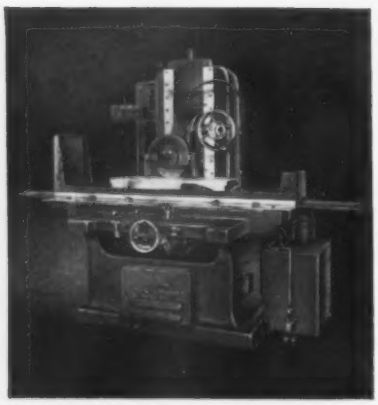
Flatness check was made on two mated girders at same time.

Each side consists of two plates fastened to 15 jacking beams, each jacking beam being manipulated by two motor operated ball-bearing screw jacks equipped with position indicators. Pressing against a supporting wall, the total of 60 jacks flex the two sides of the nozzle into the horizontal curvature needed to vary the airflow velocity. The position of the flex plates, controlled by the in-and-out movement of the jacks, makes it possible to match the required throat contours for any Mach number throughout the range of the nozzle design.

The design and manufacture of the box beams and flex plates, their surface finish, and positioning of the jacks require exact ac-

FOUND WHERE WORLD FAMOUS AIRCRAFT ARE "BORN"

GRAND RAPIDS GRINDERS



Grand Rapids No. 55 Hydraulic Feed Surface Grinder
This precision tool room type machine Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head 18". Preloaded ball bearing spindle greased for life. Spindle speeds 1925 and 2500 rpm.

Just take a look in their toolrooms! Every one of these famous aircraft manufacturers uses Grand Rapids Grinders . . . engineered and built for unusual long life of precision grinding. Our Model 55 shown here, for instance, features column and base of massive, one-piece casting for vibrationless rigidity and permanent alignment. Both longitudinal table travel and cross feed are hydraulically actuated. Wheel head has powered rapid vertical travel. Table speed is variable up to 125 fpm . . . faster than any other of this type and size.

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Just a note on your letterhead will bring you full details.

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GALLMEYER & LIVINGSTON COMPANY 400 Straight Ave., S.W., Grand Rapids, Mich.

curacy because air flow through the nozzle is extremely critical. Wall ordinates, as represented by jack row locations, require accurate positioning to secure smooth and shock-free flow during tests.

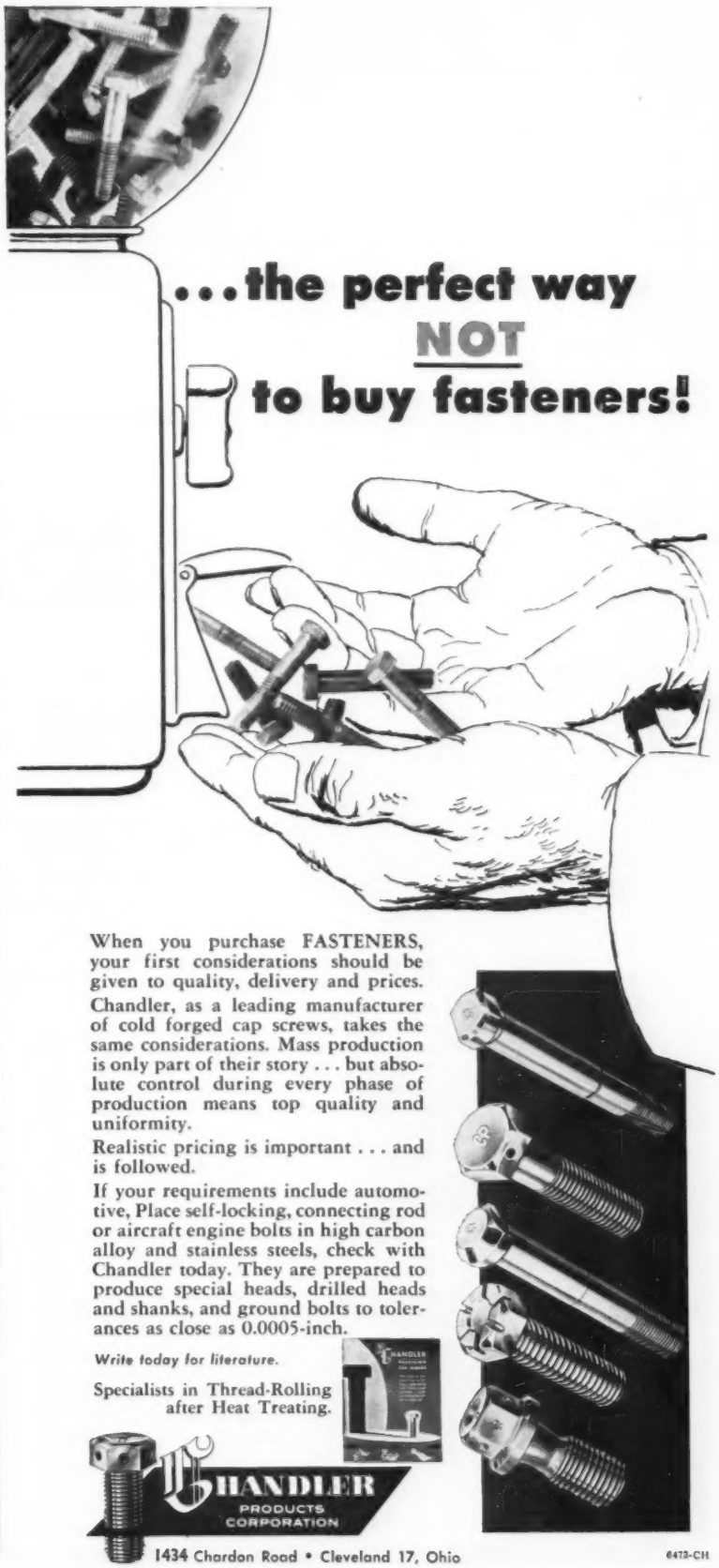
To meet all these requirements meant that the air-stream side of sidewalls, roof and floor be given a 60 micro-inch surface finish and that the roof and floor surfaces be parallel and flat throughout their lengths. Also, the entrance ends (sliding ends) of the sidewalls had to mate against a feathered edge of the tunnel ring to eliminate eddy forming obstructions.

Strongback Fabricated

In preparation for the exacting machining job on the flex plates, a strongback was fabricated to support each plate rigidly while its surfaces were planed and ground. Once fastened to this heavy steel structure, each plate could be moved about at will without danger of bending. Tooling up for the job involved several special set-ups such as constructing a special belt grinder, and adapting a milling cutter for use on planers. The milling attachment was used to mill out planing clearance at the end shoulders of each plate, cut mounting grooves on one shoulder for slip-joint mounting, and make the rough cut on the plates under or outide surfaces. The belt grinder served for final surface finish after planing.

Flatness Checked

After all machining and grinding of the air-stream side of the plates and girders was completed, the surface had to be checked for flatness. Specifications required that this check be made every 6 inches across both the width and length to an actual thickness tolerance of ±0.030 in. Transverse flatness had to be ±0.031 in. maximum with variation to be gradual enough not to exceed 0.003 in. per inch, and with the longitudinal flatness to be plus or minus 0.019 in. with variation from an 8 foot straight-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When you purchase FASTENERS, your first considerations should be given to quality, delivery and prices.
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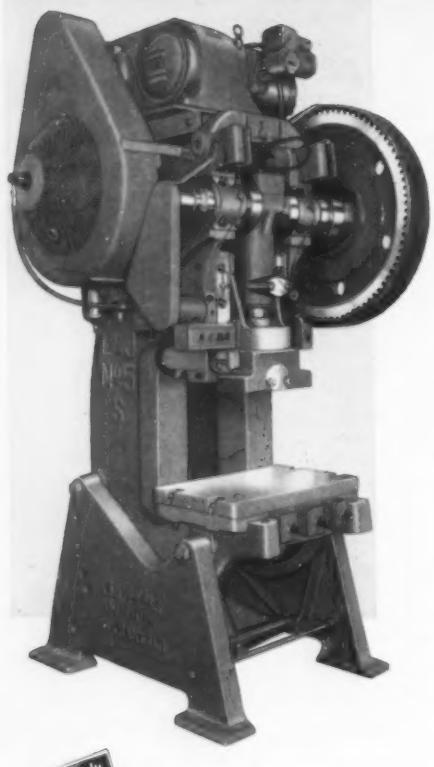
"Check to assure true flatness across surface . . ."

edge not to exceed 0.001 inch per inch.

On the box girders, the flatness check had to be carried out on two mating girders at a time to assure true flatness across the continuous surface, and that the joint edges would be in the same plane. A sixteen foot straightedge was used to check the flatness of the mating joints. The joining bolt holes were line reamed and fitted with taper-ground bolts, the two girder sections drilled for dowelling, and the pieces match marked before shipment.

For air tightness, the flex plates are fitted with air inflated seals on their ends, and on the extreme upper and lower edges which slide on the roof and floor of the nozzle. The moving edges are also protected against wear by aluminum bearing strips. The flexible plates were radiographed after welding and again after stress relieving, all in accordance with A.S.M.E. Boiler Code requirements.

New L&J No. 5 PRESS
Keeps Production Efficient



A completely new 56-ton O.B.I. punch press with the quality, accuracy and versatility to keep production costs down. It combines in a widely adaptable size the proven features that have made L&J Presses popular in all types of press shops.

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Air clutch on back shaft, variable speed drive and flanged ram optional at extra cost. Non-geared type also available.

Specifications
Capacity—56 tons. Standard stroke—4". Maximum stroke (to order)—6". Strokes per minute—46 (non-geared 95). Die space—11¼" to 18¼", stroke down, adj. up.

WRITE FOR CATALOG describing all L & J O.B.I. Presses — 20 geared and non-geared models. Capacities 14 to 90 tons. Also, 20 to 50 ton High Speed Straight Side Presses.

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Elkhart, Indiana

Materials:

Screw machine finger pads improve production.

Automatic screw machine feed finger pads which have been coated with tungsten carbide in tests under actual operating conditions should wear 15 to 20 times longer in service than unplated, hardened-steel pads.

Because of this high resistance to wear, excessive scratching of stock and short rejects due to worn pads are reportedly drastically reduced. This means less machine down-time is needed to inspect or replace pads. Manufacturers who tested the feed finger pads report that production was increased from 2 to 5 pct above average production rates.

Tungsten carbide is deposited on the pads by flame-plating, a revolutionary coating process, which was developed by Linde Air Products Co., a Division of Union Carbide and Carbon Corp. The flame-plated tungsten carbide coating has a degree of wear resistance equal to that of solid carbide, yet it is much more flexible and elastic. Thus, the use of these feed finger pads does not incur the danger of breakage or chipping.

The pads are now being distributed by Edgcomb Steel of New England, Inc., Milford, Conn., under the trademark, Lascote.

Metal Finish:

Plating cycle control saves time, material.

A plant equipped with an automatic plating cycle control system developed by the Hoffman Control Co., Cleveland, has reported a yearly saving of 102 manhours, over $400.00 in materials and a 20 pct gain in production.

The system, used in production barrel plating plants, has a control box with two signal lights and an automatic cut-off time switch. Installation is made by removing the cathode bar from each tank and replacing it with a Hoffman control box. The cut-off switch is mounted on each tank.

The operator starts current flow and the plating cycle by pre-setting the time on the switch dial. During the plating cycle a green light on the control box is on. It goes off upon completion of the cycle and a red signal light goes on. The red light signals the end of the plating cycle.

These controls are reported to permit fast visual check on each tank or the operation of the entire plant, with rejects, wasted time and material caused by overplating held to a very low minimum.

New Books:

"Salt & Water, Power & People," by Robert E. Thomas, is a short history of the Hooker Electrochemical Co. Written to celebrate the company's 50th anniversary, this well-illustrated volume is an account of the firm's development from its beginnings until the present time. 109 p.

"Chemical Trade Names and Commercial Synonyms," by Williams Haynes. This revised and enlarged second edition contains accurate, up-to-date definitions of more than 20,000 special names used throughout the modern chemical industry. D. Van Nostrand Co., Inc. $8.00. 466 p.

"Compact Heat Exchangers," by W. M. Kays and A. L. London. A summary of basic heat transfer and flow friction design data by two members of the mechanical engineering department at Stanford University. Purpose of the book is to make readily useful to heat exchanger designers the results of experimental and analytical work on compact heat-transfer surfaces. It summarizes under one cover twenty-

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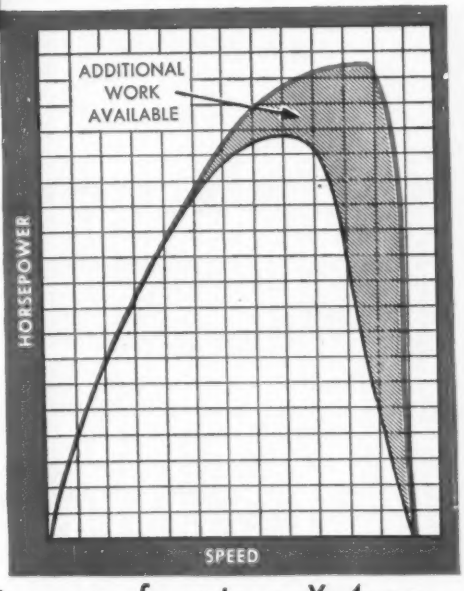

(for even better proof, put an X-4 on your job and get that extra work!)

Look up the toughest metal removal job in your plant, maybe a job that's been fouling up your production schedule for some time. Put a new Buckeye X-4 tool on that job—and stand back!

What happened to the tough job? Why, it's all finished—just like that! And the tool operator's surprised grin lets you know he's never used a tool like this before . . . a tool that whips a tough job quick and easy. With Buckeye X-4 abrasive tools working for you, you'll grin, too—every time you look at that production schedule!

Complete information on these all-new, bright-red Buckeye X-4 abrasive tools will be found in our new Catalog A-10. We'll be glad to send you a copy . . . just tell us where and to whom.

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You can get X-4 performance from your present Buckeye D, E and F Series grinders, buffers and sanders. Just tell us code names and serial numbers of tools you are now operating and we'll tell you how.

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two reports on the subject issued as a result of projects initiated by the Office of Naval Research. The National Press, Palo Alto, Calif. $5.00. 156 p.

Metal Finishing Guidebook Directory—1956 Edition. The 24th edition of a reference work devoted exclusively to metallic surface treatments. Topics covered in full length treatment include: finishing plant engineering, mechanical surface preparation, chemical surface preparation, plating solutions and operating data, special plating procedures, special surface treatments, and control-analysis-testing. Lists include: directory of suppliers, trade names, consultants, societies, schools and books in the electroplating field. Published by Finishing Publication, Inc., 381 Broadway, Westwood, New Jersey. $3.50. 604 p.

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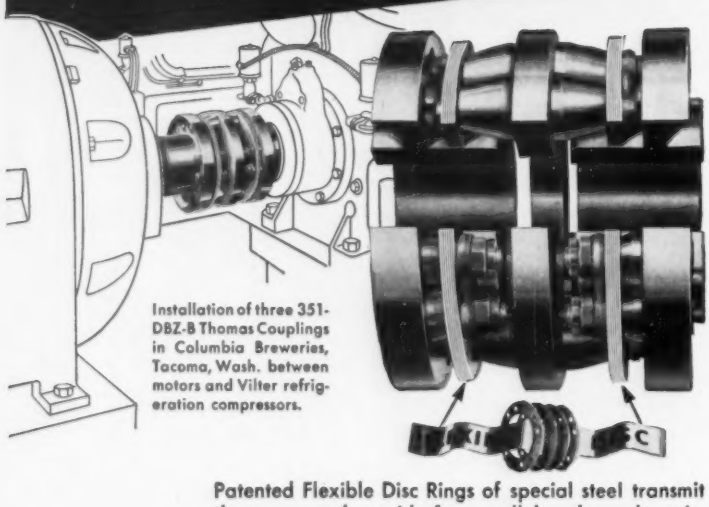
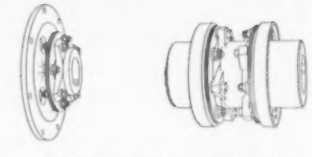


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

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Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
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WARREN, PENNSYLVANIA, U.S.A.

Index to the Yearbooks and Regional Papers of the American Iron & Steel Institute 1910-1953. Compiled by Jeanne McHugh. A helpful, informative work gathered primarily for "students and interested workers in the steel industry." The Institute's Yearbooks from 1910 through 1953 are indexed with the exception of two years (1911 and 1942) when no books were issued. Regional Technical Papers are indexed from their first year (1947) until 1953. Efforts have been made in the compilation of the index to keep it simple, thorough and easy to use. Published for the Institute by the University of Oklahoma Press, Norman, Oklahoma. $12.50. 593 p.

"Corrosion in Action" is in essence the narrative of a motion picture of the same title produced by the International Nickel Co. as an aid in understanding some of the electrochemical processes that result in corrosion. In book form it includes references to literature to provide more detailed information on particular points. In addition, there is a description of the experiments shown in the film. Well illustrated with black and white and color photographs and diagrams. The International Nickel Co., Inc., 67 Wall St., New York 5. 47 p.

"World Commerce and Governments—Trends and Outlook," by W. S. and E. S. Woytinsky. A comprehensive survey of patterns of trade, the systems of transport that feed them and the governments under which they exist. The initial section of the book gives facts, analysis and a description of trade in the world economy including the nature, value and volume of exports and imports, tariffs, agreements, payments and investments. The network of transport by air, land and sea is covered in the second section. The final portion of the book discusses the types of government in existence all over the earth; colonies and colonial status; and the full range of international agencies now in operation. The Twentieth Century Fund, 330 West 42nd St., New York 36. $10.00. 907 p.

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• TOOL BITS

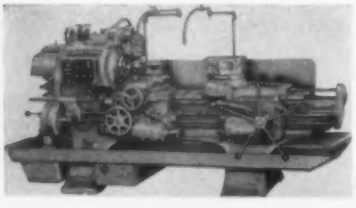
NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 109 or 110.

Lapper built to provide microinch finishing

A new 6 in. bench type cylindrical lapping machine is designed to provide microinch finishing of piece parts to 1 rms or less. Compactly made to fit conveniently on top of any work bench, the unit is a modification of the company's 12 in. cylindrical lapping machine. Reportedly capable of producing exacting tolerances in 1/3 the usual time, this lapper provides precision finishing for plug gages, cylindrical pieces, tapered plugs and pins and similar piece parts up to 6 in. in diam. Vented rollers end "cooling off" periods. *Spitfire Tool Co.*

For more data circle No. 29 on postcard, p. 109



Turret lathe redesigned for wider range of work

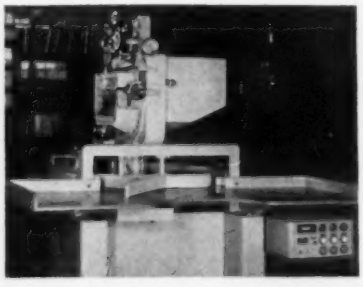
A saddle type turret lathe has been newly redesigned to accommodate a wider range of work, both as to size and type. Larger main drive motor of 20 hp permits heavier feeds to the full capacity of the latest in cutting tools. Higher spindle speeds, to 1000 rpm, provide for work of non-ferrous materials as well as smaller diameters. Hydraulic collet provides gripping force for heavier drilling. *Bardons & Oliver, Inc*

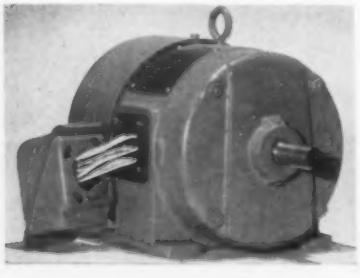
For more data circle No. 30 on postcard, p. 109

Package filler incorporates electronic counter

A package filling machine counts products handled at high speeds with an electronic counter capable of measuring 4 to 6 gross per minute. It receives cardboard boxes from the operator, conveys them to filling position under a spout, accurately counts out a predetermined quantity of screws or similar products and returns the filled box to the operator. Operator can load a three minute run of empties into the machine. Machine also handles headed articles such as tacks, common and roofing nails and others. *Batchelder Eng. Co., Inc.*

For more data circle No. 31 on postcard, p. 109





Two new motor lines in 1-5 hp range introduced

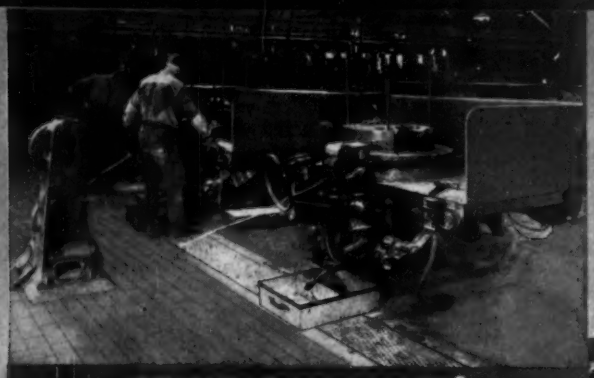
Two lines of enclosed, non-ventilated, fan-cooled motors have been introduced to replace a company line of 1-5 hp motors. Standard enclosed types (illustrated) feature a steel conduit box which has a keyhole mounting for quick and easy installation. Mounting screws need not be removed. The severe duty line of motors is basically the same as the standard except for features which make motor suitable for use in corrosive or excessively moist atmospheres. Both lines have longer perma-numbered leads for use with time-saving wire nuts. *General Electric.*

For more data circle No. 32 on postcard, p. 109

Rotary index table eliminates over-riding, skipping

Over-riding or skipping of stations is reportedly impossible on a new air-powered rotary index table as the index cylinder piston seats against the cylinder head at completion of any index movement. Loads up to 500 lb. can be carried without jarring. Unit has a 12 in. diam. and ¾ in. thick steel table top supported by bearing near edge. *General Automation Products Co.*

For more data circle No. 33 on postcard, p. 109



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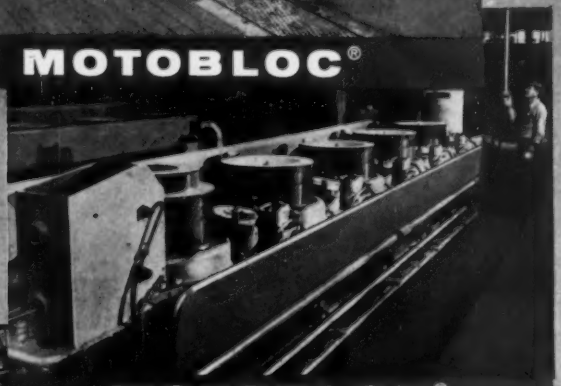

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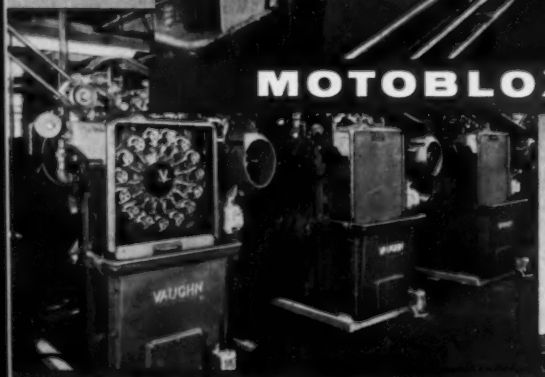

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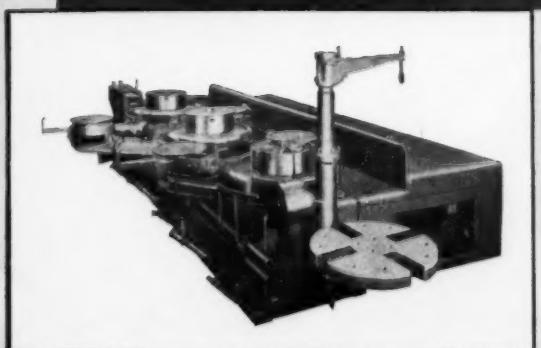

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DRAWBENCHES

"Quick on the Draw!"

High-speed, semiautomatic driller developed

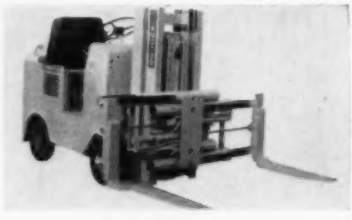
A lightweight, portable driller being used for work on sheet metal parts of aircraft is designed to utilize the proper feeds and speeds in drilling through material and cut the long time lapse between drilling operations. The unit automatically locates and drills holes in response to saw-toothed projections on an attached template. These holes may be drilled at speeds of up to 3 per second in 0.064 in. thick aluminum material, holding locations to sheet metal tolerances of plus or minus 10/-1000ths of an inch. Speed is dependent upon hole spacing, diam, depth and type of material. *Fairchild Engine and Airplane Corp.*

For more data circle No. 34 on postcard, p. 109

Hydraulic attachment adds to fork lift versatility

Use of a hydraulic clamp and offset fork attachment enables a fork lift truck carriage to be quickly adjusted laterally to handle heavy loads of varying size and shape. This versatility makes the unit suited to operations where lift is used interchangeably as a clamp truck and a fork lift truck and where a variety of different widths of loads are handled. Truck shown has 5000 lb lift capacity at 24 in. load center. *Towmotor Corp.*

For more data circle No. 35 on postcard, p. 109

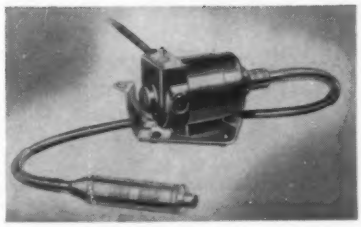


Surface plate provided in handy carrying case

A small plate for bench use, known as the Toolmakers Flat, is provided in a plywood covered carrying case. Its size is 8 in. x 12. x 2 in., weight is 15 lb, and plate is finished to an accuracy of 0.0002 in. Case has detachable cover to use flat without removing from case. *Collins Microflat Co.*

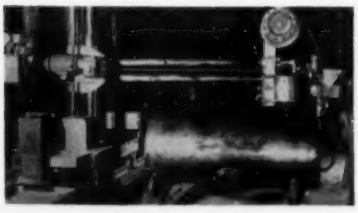
For more data circle No. 36 on postcard, p. 109

Flexible shaft tool maintains sustained torque



Designed with the power to maintain a sustained torque under load, an improved high speed flexible shaft tool is recommended for production, bench finishing, deburring, tool and die grinding and sharpening. Sheath consists of three layers—armored wire casing, wire braid and Neoprene cover and it operates smoothly when bent to as small as a 6 in. radius. Motor develops 22,000 rpm. *The Dumore Co.*

For more data circle No. 37 on postcard, p. 109

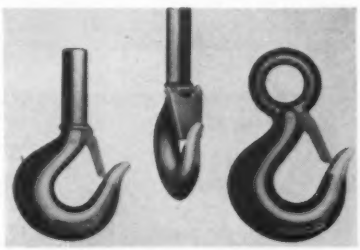


Welding head manipulators will be custom assembled

Featuring twin tube mast and ram for rigidity, a new line of automatic weld head manipulators will be custom assembled in numerous sizes and models for self-propelled and stationary types. The units are readily adaptable to all types of welding heads, submerged arc as well as shielded gas types. Either manual or motor operated control. *Worthington Corp.*

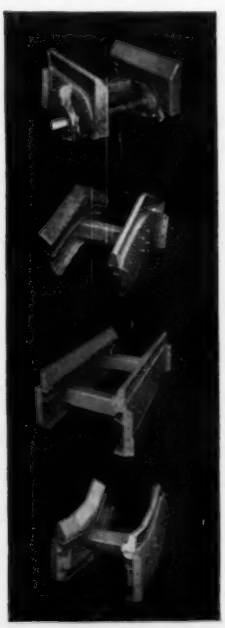
For more data circle No. 38 on postcard, p. 109

Hoist hooks designed for convenience, reliability



A new design of safety hoist hooks has been developed to provide the best in convenience and reliability. They offer rugged latches with powerful non - corrosive snap-springs so loads cannot be jarred from the hook. Latches are of sufficient size, for each hook, to allow operator ample gripping area so that fingers will not be exposed to the load carrying line. Hooks are available in both shank and eye patterns in capacities from 1200 lb to 30 ton. Units are tested on a tension machine. *J. H. Williams & Co.*

For more data circle No. 39 on postcard, p. 109



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In a single glance, you can see all of the advantages of MAY-FRAN STANDARDIZED components.

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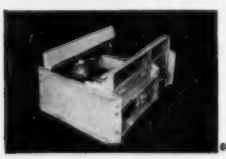

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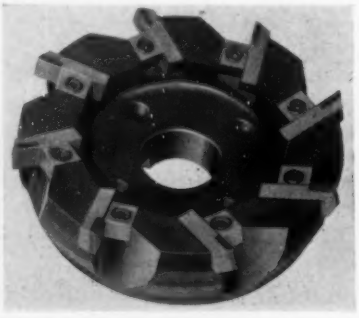
IT PAYS TO READ IRON AGE ADS TOO!

Milling cutters

A line of new shell and mill and face milling cutters, named the Eager Beavers, are designed for faster stock removal and better finish. Cited as providing proper

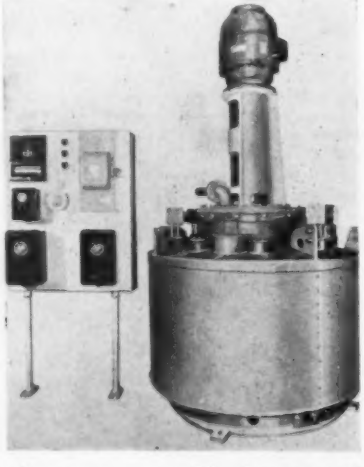


cutting angle and ample chip clearance, it is suggested that the same cutter with the blades changed to the proper grade of carbide can be used for milling all ferrous and non-ferrous materials. *Beaver Tool & Eng. Corp.*

For more data circle No. 41 on postcard, p. 109

Heater

Employing eutectic heat transfer salt as marketed by DuPont, a new unit is especially designed for heating metal-forming dies. Temperatures up to 1000°F can be produced



at no pressure with close control maintained at the point of application. Heat transfer medium has negligible vapor pressure. In addition, it is non-toxic and noncorrosive. *American Hydrotherm Corp.*

For more data circle No. 42 on postcard, p. 109

Nylon stop nut

A one-piece, washer-faced, resilient hexagon nut which is simultaneously self-tapping, locking and insulating is said to be ideal for pre-setting. As screw turns into the resilient material, the material is displaced and a counter-compressive force is exerted against the screw as continuing drive-torque is applied, resulting in a tight friction lock. Special features of the nylon nut are given as toughness, extreme light weight, strength in thin sections and resistance to corrosion, abrasion, vibration, impact, galling, seizing, conduction, electrolysis and breakdown under stress. *The American Screw Co.*

For more data circle No. 43 on postcard, p. 109

Perforating units

A new series of perforating units for straightline, staggered and overall gang-punching setups on templates, T-slotted plates and rails in presses and press brakes are equipped with two-piece punches. Because they are made this way, the punch heads may be used over and over again on new or resharpened, replaceable and interchangeable punch bodies. Flat head socket screws fasten the

punch bodies and punch heads together into simple-operating punches. Punches are removed from the holder by a simple lifting-out motion and replaced by lowering into top of holder by ends of retainer springs. Units are designed for punching holes up to 3½ in. in diameter in material to ⅛ in. thick. *Punch Products Corp.*

For more data circle No. 44 on postcard, p. 109

Hardness tester

A new Brinell hardness tester incorporates a paint spray attachment which synchronizes with the testing cycle of the machine so relative hardness of parts is automatically indicated by a spot of paint. The tester is designed to fit into a roller conveyor. In operation, castings are rough ground to remove scale and then rolled into place on the tester. Operator locates parts by means of a stop located at the rear of the rollers. He push-button starts the machine's hydraulic cycle. As ball descends toward casting, roller section drops down, leaving the casting seated on anvils. Impression is made and acceptable parts are paint spotted automatically. After interval, load is released, ball retracts and rollers lift up so casting can be rolled to conveyor. *Steel City Testing Machines, Inc.*

For more data circle No. 45 on postcard, p. 109

Spur-geared hoist

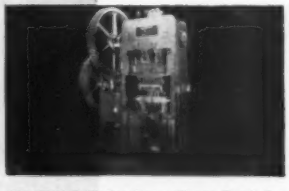
A new portable, lightweight aluminum, level-operated, spur-geared hoist is designed to supply a compact, general utility unit which can do a variety of heavy pulling or lifting jobs; vertically, horizontally, or at any angle and which requires a minimum of space for these operations. A 5 ton capacity model of the unit, which is called the "Cum-a-Long Puller," weighs only 62 lb. *Ohio Hoist & Mfg. Co.*

For more data circle No. 46 on postcard, p. 109

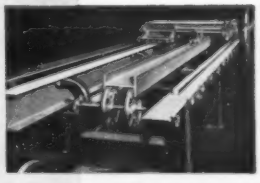
FOR FASTER
HEAVY DUTY PUNCHING

BEATTY
No. 11-B Heavy Duty Punch

HANDLES EVEN THE MOST COMPLICATED PUNCHING IN A SINGLE PASS



BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.



BEATTY Spacing Table handles web and flange punching without roll adjustment.

In less time, with less manpower, this BEATTY Heavy Duty Punch handles even the most complicated punching jobs . . . produces up to 34 patterns without a single tool change.

Used with the standard BEATTY Spacing Table, it accommodates steel shapes up to 65 ft. long and plates up to 42 in. wide. With exceptionally large die space, the machine can be tooled to the specific needs of the job—punches webs and flanges. Spacing of holes and slots is precise and practically automatic with the BEATTY Spacing Table.

In addition to increasing your output, this versatile unit reduces your labor costs. One operator and one helper are all the manpower required, and the machine is built for either right or left hand operation.

Consult a Beatty engineer for more information on a *job-engineered* BEATTY installation to fit your needs.

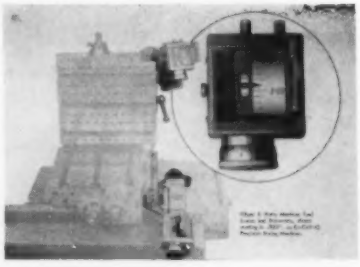
BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

BEATTY
MACHINE & MFG. CO.
HAMMOND, IND.

Optical equipment for work positioning on borer

A precision boring machine offers optical equipment for manually positioning work quickly, reliably and accurately for multiple precision operations. It features such equipment on its work holding fixtures providing horizontal motion of 9 in. and vertical motion of 4 in. as shown clearly in two conveniently located screens. Projection screens are well out of the way of the work. *Engis Equipment Co.*



For more data circle No. 47 on postcard, p. 109

LOOK AT THIS UP-TO-THE-MINUTE EXHIBIT OF

POPE PRECISION SPINDLES

EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

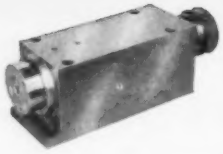


EXHIBIT B

POPE 1 HP, TOTALLY ENCLOSED 3600 RPM MOTORIZED, CARTRIDGE TYPE PRECISION SPINDLES with double row cylindrical roller bearings and separate thrust bearings for no endwise movement of the shaft

EXHIBIT D

POPE HEAVY DUTY, ¾ TO 100 HP DIRECT MOTORIZED SPINDLES for Horizontal or Vertical Skin Milling, Grinding, Milling, Boring and Other Operations

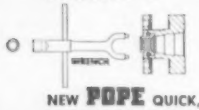
EXHIBIT F

POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

EXHIBIT G

POPE INTERNAL GRINDING SPINDLES for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT C



NEW POPE QUICK, SELF-REMOVING WHEEL HOLDER for surface grinders and tool and cutter grinders — eliminates the necessity of a wheel puller. Write for quotations.

EXHIBIT E

POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for *Angular Adjustment In A Vertical Plane*

EXHIBIT H

POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES for speeds up to 100,000 RPM

WRITE FOR COMPLETE SPECIFICATIONS, PRICE AND DELIVERY

No. 107

Specify POPE PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

Gage

A 4-way drill point gage has been produced to allow measurement of chisel point, point angle and clearance angle in a brief time. The gage includes a point center scale. Made of stainless steel, the unit is in the form of two semicircular disks held together at the center by a pivot. The bottom disk is 4 in. in diam and contains one-degree calibrations along the rim for

measuring: any chisel point angles from 110° to 135°; any point angle from 40° to 90°; and any clearance angle from 0° to 20°. *Swanson Mfg. Co.*

For more data circle No. 48 on postcard, p. 109

Driller

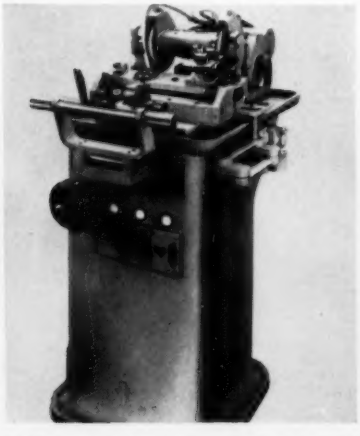
A vertical, indexing-type, drilling and chamfering machine employs one cam feed unit and one barrel cam feed unit. Designed with quadruple loading, automatic clamping, unclamping and ejec-

tion, the machine drills and chamfers the pin hole of steering knuckles at a rate of 1600 parts per hr reportedly at 100 pct efficiency. *Hartford Special Machinery Co.*

For more data circle No. 49 on postcard, p. 109

Grinding machine

A new copy grinding machine permits simultaneous grinding of two duplicate lathe tools, form tools, profile gages or production parts in one simple operation. A template, enlarged 5 times, effects the copying process through a parallelogram linkage to the twin tool



holders holding the workpiece. A pair of diamond dressers keep the wheels trued for accurate grinding. A cylindrical grinding attachment which permits grinding of circular pieces up to 4 in. in diam is also available. *Carl Hirschmann Co., Inc.*

For more data circle No. 50 on postcard, p. 109

Locknuts

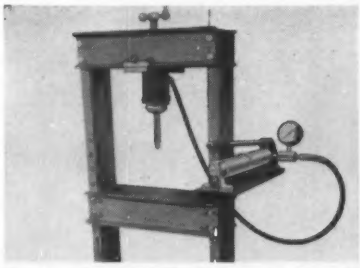
A new line of locknuts are one-piece, free spinning and reusable units. The upper portion of the nut is slotted and the bottom face is undercut, so that when the nut is tightened, the threaded upper

segments move inward causing the nut to produce a vibration-proof lock on the threads of the screw. The locknuts, made of steel, brass, aluminum and stainless, are available in all machine screw sizes. *Jacobson Nut Mfg. Corp.*

For more data circle No. 51 on postcard, p. 109

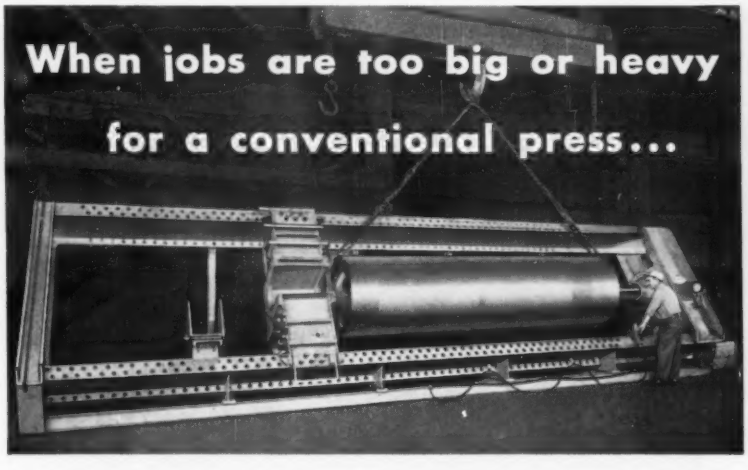
Press offered for "do-it-yourself" assembly

A 17½ ton press offered for plant assembly includes all parts—pins, bolts, spacers, ram holding plate, channels and angles—pre-cut to size and shipped broken down. All the requirements are drilling the punched holes, painting and assembling. The unit is 58 in. high, 23½ in. wide and requires a floor space of 28 in. x 27½ in. *Owatonna Tool Co.*



For more data circle No. 52 on postcard, p. 109

When jobs are too big or heavy for a conventional press...



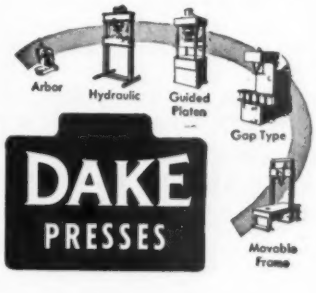
THE DAKE HORIZONTAL INCLINED PRESS is recommended for work on jobs that are so big or heavy that it is more convenient to do press work while they remain suspended from an overhead crane or hoist.

For instance in the illustration above, a 7-inch shaft is being pressed into the cable drum for a 200-ton overhead traveling crane. The drum is 17 feet long and 4 feet in diameter, and is supported on a crane hook.

This particular press (Model 32-100) is 33 feet long overall, and has a daylight opening of 25 feet. It has 300 tons capacity, a 60° inclined frame, 26-inch stroke, and a ram-to-table distance from 25 inches to 25 feet. The table is moved along the frame with a hand winch.

Dake Hydraulic Presses are engineered to meet such a variety of shop requirements that the engineering is probably almost done on the press you need. Let us quote.

DAKE CORPORATION, 602 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE CORPORATION
602 Seventh St., Grand Haven, Mich.
Please send me Catalog No. 350.
Name_____
Company_____
Address_____
City_____ Zone____ State_____

Perforations perplexing you?

If you have a design problem that's got you down maybe Hendrick can be of help. Sometimes the easiest and quickest way to enhance a product's beauty is to include a pleasing pattern of perforations in its design. Hendrick perforated metal not only helps increase a product's overall attractiveness, but also adds to its saleability as well. And whatever material you're using . . . whether it's metal, masonite, rubber, plastic, hard or insulated board for decorative display or fabricating purposes you can draw on Hendrick's long experience and perforating facilities to fill the bill. Write for details.

...better call HENDRICK

Hendrick
MANUFACTURING COMPANY

SEE OUR CATALOG IN SWEET'S

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Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

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LOW COST
Stainless Steel?

. . . then you want
MicroRold® 430 Sheet

MicroRold Type 430 is a straight chromium-stainless with a nominal composition of 17% chromium. Though it is less resistant to corrosion, it retains all of the other desirable qualities of stainless and has proven very satisfactory in a wide range of mild corrosion applications.

MicroRold 430 is the least expensive of all stainless types because it does not contain nickel. This results in a 7¾c per pound difference in base price between Type 430 and Type 302, the most popular higher grade stainless. A saving of $155 per ton is possible and is of merit to cost-conscious fabricators.

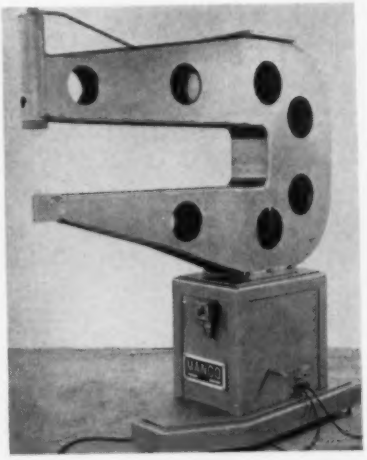
MicroRold Type 430 sheets are available in thicknesses .005" to .109" with 2B or 2D finishes; and in thicknesses .010" to .109" in No. 3, 4 and 7 finishes.

Send for your copy, "Care and Use of 430 Stainless".

Washington Steel *Corporation*
1-L WOODLAND AVE. WASHINGTON, PENNSYLVANIA

Hydraulic riveter

A new hydraulic riveter is recommended for its ability to rivet varying thicknesses of metals without time consuming adjustments of the riveting power stroke. Under this system the ram develops pressure as it meets resistance until developing its maximum thrust of 12 ton. Cycling is completely

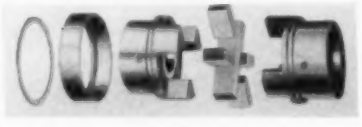


automatic and the pressure obtained in the final thrust can be infinitely adjusted by one control, the manufacturer states. Present unit has a 48 in. reach, but the maker says, the reach can be designed to accommodate other requirements. *Manco Mfg. Co.*

For more data circle No. 53 on postcard, p. 109

Flexible coupling

A new radially removable flexible coupling that is cited as providing easy assembly and disassembly is now being manufactured. The unit is described as lubrication-free and is recommended for centrifugal and impeller pumps and other in-



stallations where radial removability is required. Six sizes are available, ranging from 2.58 to 29.6 hp at 100 rpm. All feature reversible cushions which can be reversed on unidirectional loads. *Lovejoy Flexible Coupling Co.*

For more data circle No. 54 on postcard, p. 109

ELECTRIC WELD TUBE MILLS

The photo shows the tube forming mill and welder of a complete Yoder mill recently installed for an Italian customer. Although it looks very much like a standard Yoder mill, it embodies special mechanical and electrical innovations designed for *tube production at speeds up to 350 fpm*—from 200 to 300% faster than heretofore considered practical by the resistance-weld process.

This is just one example of the many new things introduced by Yoder in pipe and tube making equipment, to meet widely varying production needs. Other recent Yoder developments are induction weld mills for making steel as well as nonferrous pipe and tubing, at speeds never before approached by this process, and adding greatly to its recognized economic advantages.

For more complete information about the latest technological advances in Yoder tube mill equipment, write, wire or phone

THE YODER COMPANY

5510 Walworth Ave. • Cleveland 2, Ohio

Literature on Request:

☐ **1.** Electric Weld Tube Mills for *Steel Tubes* up to 4" diameter.

☐ **2.** *Induction Weld* Tube Mills—sizes up to 8" diameter for aluminum, nickel, copper, brass, inconel, monel, stainless and other alloys.

☐ **3.** *Pipe Mills*—electric weld—for sizes up to 24" diameter.

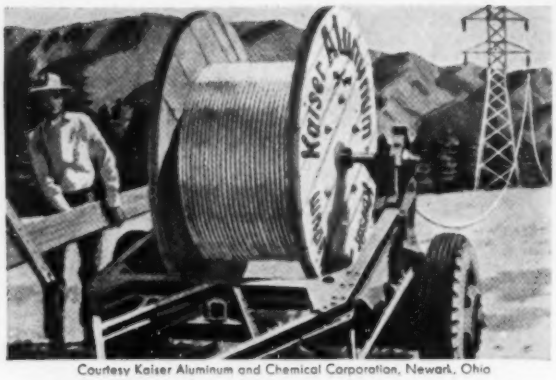
ENGINEERING YODER MANUFACTURING

PIPE AND TUBE MILLS—Electric Weld

ROTARY SLITTING LINES

COLD ROLL FORMING MACHINES

The PROOF of the STEEL is in its PERFORMANCE



Courtesy Kaiser Aluminum and Chemical Corporation, Newark, Ohio

*DSC *ACSR Core Wire Supplies the Muscle for Aluminum Power Transmission Cable*

The steel wire used for reinforcement in aluminum cable cores is a Specialty Wire. Produced by our Portsmouth Division, it is a high carbon wire, hard drawn and heavily galvanized.

ACSR specifications are not easy to meet. They permit little leeway in chemical composition, physical properties, weight of coating, dimensions and finish. Uniformity is a must.

The Record

During the full year of 1955 we supplied millions of pounds of Portsmouth ACSR wire. Out of every 100,000 pounds shipped, 99,470 pounds on the average met all acceptance tests . . . a performance score of 99.47%.

Whether it's Rod and Wire products or Sheet and Strip, *DSC steelmanship* is the same. Your DSC Customer Representative will help you wherever possible.

*Aluminum Conductors Steel Reinforced

Customer Satisfaction Is Our No. 1 Job

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Welded Wire Fabric

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COLD ROLLED STEEL STRIP: Coils • Cut Lengths • All Tempers.
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The Iron Age SUMMARY . . .

Watch for developments on the steel price front soon . . . Some producers are anxious for more income to finance expansion . . . Labor will be loaded for bear.

The Price Pot . . . The steel price pot is about ready to boil over. Some producers are beginning to champ at the bit. They need higher prices to help pay for the biggest steel expansion program in years.

If the pressure grows strong enough, there could be an across-the-board price increase of $3 to $4 per ton, soon. Perhaps more. Meanwhile, advances in steel extras—additional charges for special requirements—have increased average steel prices (base plus extras) about $1.30 per ton since last July. This is exclusive of extra revisions in tinplate, which is sold largely on a contract basis.

Although business and profits have been good, steel producers argue that their return on investment is not up to return on sales. And with expansion costs averaging $200 per ton—a lot more than the book value of installed capacity—the need for higher prices is apparent.

The Labor Angle . . . Recent revisions in extras on hot-rolled carbon sheets and strip average out to about $3 per ton increase, and similiar extra changes on carbon plates, about $5 per ton. As a result of these and other changes, warehouse prices have risen accordingly.

Steel producers are more concerned than they care to admit over the outlook in steel labor this summer. Dave McDonald's United Steel Workers will play up better steel profits for all they're worth.

Mr. McDonald likely will keep steel producers on tenterhooks until the last minute as far as saying what his actual price for settlement will be. He's certain to ask for a substantial wage increase, supplementary unemployment benefits, and the union shop.

The recent settlement for 15 cents an hour in the oil industry and "built in" increases ranging from 6 cents an hour in other industries will be further talking points for Mr. McDonald.

Labor's Price . . . If steel labor's price for another year of peace in the industry is 17-18 cents an hour—as some suspect—it will be touch and go on the question of a strike. If Mr. McDonald wins, steel prices may have to rise as much as $8-9 per ton to compensate.

Automotive cutbacks are having an effect on conversion, warehouse, premium-price mills, and mills distant from auto plants. But major consumers haven't felt the changes as yet.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week 2,437	Last Week 2,449	Month Ago 2,386	Year Ago 1,785
Ingot Index (1947-1949=100)	151.4	152.2	147.7	111.0
Composite price				
Chicago	98.5	101.5*	97.5	83.0
Pittsburgh	102.0	101.0	102.0	90.0
Philadelphia	103.0	102.0*	104.0	76.0
Valley	96.0	98.0*	99.0	70.0
West	99.0	97.0*	101.0	79.0
Detroit	103.0	100.0	103.0	70.0
Buffalo	105.0	105.0	105.0	84.0
Cleveland	101.0	103.0*	100.0	75.5
Birmingham	98.5	96.0	95.0	76.5
S. Ohio River	96.0	97.5	89.0	73.5
Wheeling	104.0	104.0*	96.0	81.0
St. Louis	90.0	106.0	99.0	36.0
Northeast	83.0	85.0	80.0	31.0
Aggregate	99.0	99.5	98.5	74.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron (Gross Ton)	$59.09	$59.09	$59.09	$56.59
Scrap, No. 1 hvy (gross ton)	$49.50	$50.83	$53.67	$35.83
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	23.20
Copper, electrolytic	43.00	43.00	43.00	33.00
Lead, St. Louis	15.80	15.80	16.30	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin Straits, N. Y.	99.00	102.00	107.00	90.75
Zinc, E. St. Louis	13.50	13.50	13.50	11.50

Expect Pinch In Oil Country

Demand at mill level expected to hit peak point by July . . . Mill quotas are off 25 to 50 pct . . . Bar demand still heavy . . . Warehouse business bustling.

◆ YOU CAN expect a pinch in oil country goods by mid-year. Tubing and casing stocks in drillers' hands at present aren't in too bad shape. Some producers are actually carrying maximum inventories.

In-transit stocks, however, are practically non-existent, and as of first quarter, some mill quotas were reduced by as much as 25 and even 50 pct.

Drillers say second quarter quotas are no higher than they were for first quarter. And, indications are that the mills will not be able to substantially boost their oil country goods quotas for the balance of the year.

Taking into account the relatively good inventory stocks most drillers say they have on hand right now, it isn't expected that a real squeeze on supplies will develop until about July. Drilling operations normally get into full swing in March and it's felt current inventories will be sufficient for the initial four months' work period.

However, with the predicted drilling rate for this year expected to top last year's level, some kind of operational readjustment, it's felt, will have to be made after July.

Correction: On page 148 of the Feb. 2 issue, price extras for gage, width, and length for hot-rolled sheets as announced by U. S. Steel were incorrectly reported as reflecting an increase ranging from 5¢ to 15¢ per lb. This should have read: 5¢ to 15¢ per cwt. Extras for hot-rolled strip should have read: an increase ranging from 5¢ to 35¢ per cwt.

SHEETS AND STRIP . . . Some further easing of pressure for sheet on the part of automotive producers is noted again this week in **Detroit**. In spite of the letup, however, demand is continuing at substantial levels. The pinch at the moment is on hot-rolled sheet which is not as plentiful as cold-rolled sheet. Word from **Chicago** is that there have been as yet no cutbacks in sheet and strip production at the mill level. And, cutbacks at the warehouse level in consumer buying have been negligible so far. Consumer inventories, with the possible exception of farm equipment inventories of hot-rolled sheet, continue very low. It's felt in some quarters that a spring pickup in tinplate demand may even force a further curtailment of some cold-rolled sheet quotas. A few customers indicate that some of their orders for cold-rolled sheet have been set back on mill delivery schedules from March to April. This appears to be the exception rather than the rule, however. Over-all, appliance manufacturers and warehouses say their strip and sheet inventories continue to run on a hand-to-mouth basis. In **Cleveland**, some mills are being informed by the automakers that it's expected early spring automotive sales will be heavy. It's felt, in turn, that once existing automobile inventories are cleaned out, pressure will again mount from **Detroit** for stepped-up steel orders, principally on sheets. Steel producers, however, say they have their houses in order this time and there won't be a great tendency to overbook on orders as there was some months ago. In the **East**, mills are opening second quarter order books on sheet and strip, expect delivered tonnages will be about the same as they were for first quarter.

BARS . . . There's some disagreement between producers and consumers on this item in **Chicago**. Some mills plan to be current on deliveries by the end of first quarter, though they're planning no allotment increases in second quarter. Salesmen for an out-of-area mill, however, report they can't give customers the delivery quota they want and don't expect to be current on deliveries by the end of first quarter. As with sheet, automotive demand for bars continues strong. Farm equipment producers and warehouses are also continuing to take their full mill quotas, though both have strong inventories, little surplus stocks. In **Detroit**, the supply situation on forging bars and smaller sizes isn't as critical as it was two weeks ago. Indications are that automakers now have a pretty good supply on hand in all sizes.

PLATES . . . This item will be as hard to find as a needle in a haystack for the balance of the year in **Chicago**. Customers who aren't already on mill order books will have a difficult time getting plate on a new-order basis well into fourth quarter. Most mills are already tied up filling current orders for the remainder of the year. Demand for plate in **Detroit** is still at a high pitch. Some producers, however, feel that the easing in demand for other products will eventually help cut down their overburdened order backlogs. Right now, there's still enough business around to last through the third quarter. And, in **Pittsburgh**, most producers see little hope of stepping up their plate output before the end of this year.

WIRE PRODUCTS . . . Some pickup in dealer buying of merchant wire is noted in **Pittsburgh**. As yet, however, the demand isn't hurting mill inventories. Farm demand for merchant wire both in the **Midwest** and **East** is expected to show improvement over 1955. Most districts report manufacturers wire demand very heavy.

WAREHOUSE . . . Virtually all districts report that warehouse business is showing little signs of slackening. A large **Cleveland** firm racked up its best single sales month since World War II last week. Demand is universal with particularly heavy tonnages going to appliance and automotive subcontractors.

Purchasing Agent's Checklist

STEEL: How new price extras add up . . . . . p. 47
New carburizing series for critical gearing . . . . . p. 92

TOOLS: Diamond developments raise big questions . . . . . p. 75
Carbide tip offers faster drilling . . . . . p. 87

Comparison of Prices

(Effective Feb. 7, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 7 1956	Jan. 31 1956	Jan. 10 1956	Feb. 8 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled Sheets	4.325¢	4.325¢	4.325¢	4.06¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	42.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
Rails: (per 100 lb.)				
Heavy rails	$4.725	$4.725	$4.725	$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	$68.50	$68.50	$68.50	$64.00
Slabs, rerolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90
Finished Steel Composite: (per pound)				
Base price	5.174¢	5.174¢	5.174¢	4.797¢

	Feb. 7 1956	Jan. 31 1956	Jan. 10 1956	Feb. 8 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$63.69	$63.69	$63.69	$61.19
Foundry, Valley	59.00	59.00	59.00	56.50
Foundry, Southern, Cin'ti	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	59.00	59.00	59.00	56.50
Basic, del'd Philadelphia	62.77	62.77	62.77	60.27
Basic, Valley furnace	58.50	58.50	58.50	56.00
Malleable, Chicago	59.00	59.00	59.00	56.50
Malleable, Valley	59.00	59.00	59.00	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢

‡ 74.76 pct Mn base.

Pig Iron Composite: (per gross ton)				
Pig Iron	$59.69	$59.69	$59.69	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$49.50	$50.50	$53.50	$36.50
No. 1 steel, Phila. area	51.50	52.50	55.50	36.50
No. 1 steel, Chicago	47.50	49.50	51.00	34.50
No. 1 bundles, Detroit	44.50	46.00	45.50	29.00
Low phos., Youngstown	54.50	54.50	59.50	36.50
No. 1 mach'y cast, Pittsburgh	55.50	55.50	55.50	43.50
No. 1 mach'y cast, Philadel'a	54.50	56.50	57.50	43.50
No. 1 mach'y cast, Chicago	52.50	52.50	56.50	45.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$49.50	$50.83	$53.67	$35.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$14.25
Foundry coke, prompt	16.25	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$43.00	$43.00	$43.00	$33.00
Copper, Lake, Conn.	43.00	43.00	43.00	33.00
Tin, Straits, New York	99.00†	102.00	107.00	90.75
Zinc, East St. Louis	13.50	13.50	13.50	11.50
Lead, St. Louis	15.80	15.80	16.30	14.80
Aluminum, virgin ingot	24.40	24.40	24.40	23.20
Nickel, electrolytic	64.50	64.50	64.50	67.67
Magnesium, ingot	33.25	33.25	33.25	27.75
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	60.50	61.00	61.50	62.00	.....
Birdsboro, Pa. *B6*	60.50	61.00	61.50	62.00	.....
Birmingham *R3*	54.50	55.00*	.....	.....	.....
Birmingham *W9*	54.50	55.00*	59.00	.....	.....
Birmingham *U4*	54.50	55.00*	59.00	.....	.....
Buffalo *R3*	58.50	59.00	59.50	.....	.....
Buffalo *H1*	58.50	59.00	59.50	.....	.....
Buffalo *W6*	58.50	59.00	59.50	60.00	.....
Chester *C17*	60.50	61.00	61.50	.....	.....
Chicago *I4*	58.50	59.00	59.00	59.50	.....
Cleveland *A5*	58.50	59.00	59.00	59.50	63.50
Cleveland *R3*	58.50	59.00	59.00	.....	.....
Duluth *I4*	58.50	59.00	59.00	59.50	.....
Erie *I4*	58.50	59.00	59.00	59.50	.....
Everett *M6*	.....	62.50	63.00	.....	.....
Fontana *K1*	64.50	65.00	.....	.....	.....
Geneva, Utah *C7*	58.50	59.00	.....	.....	.....
Granite City *G2*	60.40	60.90	61.40	.....	.....
Hubbard *Y1*	.....	.....	59.00	.....	.....
Lone Star *L3*	.....	55.00	.....	.....	.....
Midland *C11*	58.50	.....	.....	.....	.....
Minnequa *C6*	60.50	61.00	61.50	.....	.....
Monessen *P6*	58.50	.....	.....	.....	.....
Neville Is. *P4*	58.50	59.00	59.00	.....	.....
N. Tonawanda *T1*	.....	59.00	59.50	.....	.....
Pittsburgh *U1*	58.50	.....	.....	59.50	.....
Sharpsville *S3*	58.50	59.00	59.00	59.50	.....
So. Chicago *R3*	58.50	.....	59.00	.....	.....
Steelton *B3*	60.50	61.00	61.50	62.00	66.50
Swedeland *A2*	60.50	61.00	61.50	62.00	.....
Toledo *I4*	58.50	59.00	59.00	59.50	.....
Troy, N. Y. *R3*	60.50	61.00	61.50	62.00	66.50
Youngstown *Y1*	.....	.....	59.00	59.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. *Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron Buffalo, *H1*, $68.75; Jackson, *J1*, *G1*, $67.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

←To identify producers, see Key on P. 156→

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, rerolling	22.25	24.75	28.75	25.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Sheets	44.25	44.50	52.25	47.25	63.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	56.25	44.25	59.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	66.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*, *J3*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U3*; New Castle, Ind., *I2*; Ft. Wayne, *J4*; Philadelphia, *D5*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa. *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher); *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*; Philadelphia, *D5*; Detroit, *R5*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7* Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown; *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Philadelphia, *D5*

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J3*; McKeesport, *F1*; Massillon, Canton, O., *R3* Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*.

Market Shows New Price Dips

Further weakness in steelmaking prices shows up in Pittsburgh, Philadelphia . . . Chicago market evidences greater firmness . . . Other areas report downturns . . . Composite dips.

◆ FURTHER WEAKNESS in steelmaking grade prices is reported this week from Pittsburgh and Philadelphia.

On the basis of broker-dealer negotiations, the price of No. 1 and No. 2 heavy melting steel in Pittsburgh is off $1, with No. 2 bundles down $2 from previous levels.

Also on the basis of latest reported sales, and the fact that brokers can buy from dealers at lower prices, steelmaking grades in the Philadelphia area dropped $1 to $2 a ton.

Meanwhile, despite repeated offers at prices substantially lower than the listed market price, the Chicago market continued to show evidence of greater firmness. Notable was a slowdown of shipments in turning grades at $28 and $30.

Elsewhere, in New York, new purchases in an adjacent consuming area lowered steelmaking grades $1 a ton.

In Cleveland, the No. 2 heavy melting price has shown a return to the normal differential with primary grades in sale reported at $45 on the topside. Some softening in blast furnace grades is reported, with mixed borings and turnings down $1 on the basis of a local sale.

In virtually all other market areas, the trend toward lower prices for most grades is reported. In Detroit, the weakness was reflected in all grades when a local mill suddenly dropped out of the market. In Birmingham, the market is so unsettled that brokers are hesitant to quote prices. And, in Boston, steelmaking grade prices dropped heavily as a fluid market finally stabilized at lower levels.

On the basis of the continued downturn in steelmaking prices in Pittsburgh and the East, THE IRON AGE steel scrap composite dipped to $49.50.

Pittsburgh . . . Further weakness developed in steelmaking grades as latest sales of No. 2 bundles are reported at $41, down $2 from previous levels. No. 1 and No. 2 heavy melting are also off another $1 on the basis of most recent broker, dealer negotiations. Blast furnace grades also slipped during the past week with shoveling turnings off $2 and machine shop down $1 a ton. Low phos and other premium grade scrap prices are also reported lower as a reflection of general market conditions. Brokers have successfully covered all of the latest orders and in many cases at better than normal margins.

Chicago . . . Four scrap prices appeared incorrectly on the Feb. 2 scrap price page, page 152. Correct prices were—No. 1 heavy melting $47-48, No. 2 heavy melting $38-39, No. 1 dealer bundles $48-49, and low phos punchings and plate $55-56. Despite repeated offers at prices substantially lower than listed market price, the Chicago market continued to give evidence of greater firmness. Notable was a slowdown of shipments in turning grades at $28 and $30. An offer for RR steel car axles at $60 was refused, and a similar offer of $65 for reroller axles failed to depress the market. With steel operating rates still moving up, with a spell of cold weather developing, and with reports that further tightness in finished steel demand is still ahead, the forecasters who predicted a February upturn for scrap are sharpening their pencils. Reported offers for dealer No. 1 heavy at $47 were attracting little action at press time.

Philadelphia . . . On the basis of a reported sale, and the fact that brokers can buy from dealers at lower prices, the market dropped $1 to $2 a ton in steelmaking grades. Also off is the cast market, with cupola cast prices down $3.

New York . . . New purchases in an adjacent consuming area have lowered steelmaking grades here $1. Other mills appear to be holding off on new buying to see which way the price will jump.

Detroit . . . The market continued to soften here despite the fact that a local mill made a buy last week on a $46 fob basis. The weakness was reflected in all grades when the mill suddenly stopped buying.

Cleveland . . . Cleveland and the Valley market held firm but slow last week with one order in Cleveland for about 10,000 tons at $51 top for No. 1 heavy melting. A second fringe area mill bought low phos for electric furnaces at $54 or low end of range, its second purchase in a few weeks. No. 2 heavy melting in Cleveland has shown return to normal differential with primary grades in sale last week at $45 delivered.

Birmingham . . . The market is so unsettled that brokers are hesitant to quote price, especially on specialty items. They say that almost any price that is quoted would be correct because buyers are offering from $1 to $2 difference and sellers are accepting anything they can get.

St. Louis . . . Steel operating rate dropped 17 points because one large furnace was down for repairs but is now back in action.

Cincinnati . . . Market is being stirred up by a major order from a mill on fringes of the District and will probably settle $1 or $2 when filled.

Buffalo . . . Last week's downward trend in prices continued this week as steelmaking grades dropped $3 a ton.

Boston . . . Prices of steelmaking grades dropped heavily as a fluid market finally stabilized at lower levels. Limited purchases have confirmed broker feeling that the market was off. Outside the steelmaking range prices were steadier, and in some blast furnace grades prices were adjusted upward.

West Coast . . . Prices are off $1 to $7 on most grades of scrap. Several mills say it's a result of a reported new Japanese scrap-buying combine.

Move Scrap Faster, Move It Longer With a Bucyrus-Erie 22-B Crane

To bring added efficiency and economy to your scrap handling operations, investigate the many advantages offered you by a Bucyrus-Erie 22-B crane. To meet your needs most exactly, three types are offered — the crawler-mounted standard and heavy-duty machines, and the carrier-mounted Transit Crane.

For efficient, economical, safe operation, they feature power-controlled lowering for the main hoist line.* In addition, hoisting and lowering of the boom is power-controlled, fully independent of all other functions. With this combination, lowering control is so accurate that loads can be positioned quickly, wherever you want them.

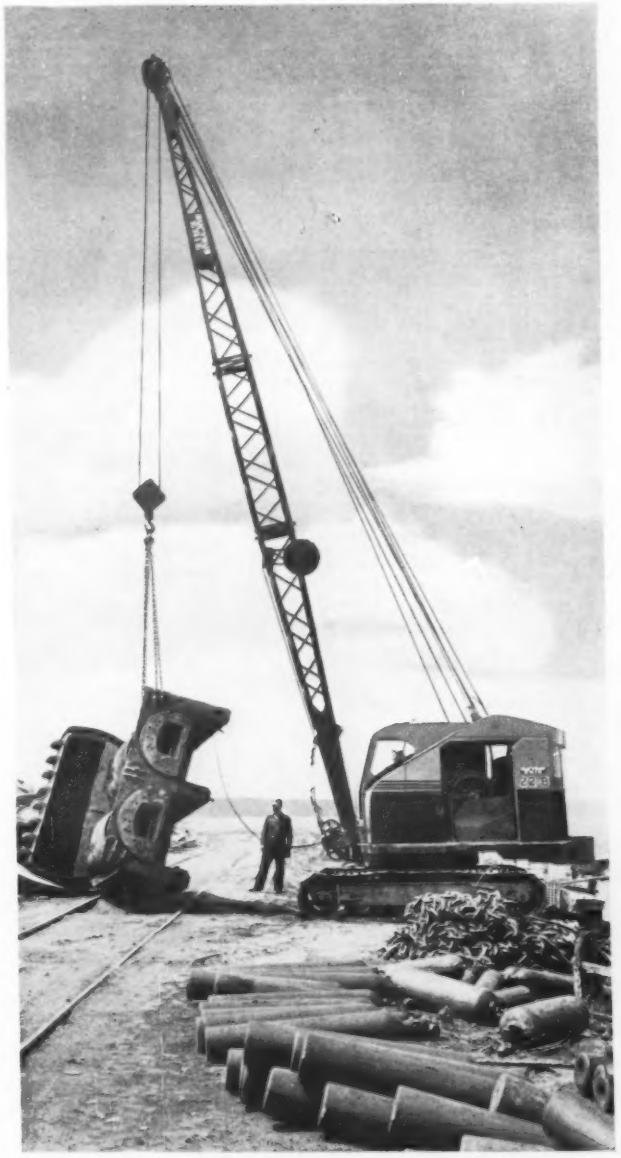
For quick adaptability to the job at hand, they feature open-throat boom design which permits easy rigging of multi-part lines. Butt splices make it easy to insert extra sections, too, for long boom operations in congested areas.

And, Bucyrus-Erie cranes stay on the job longer, too, taking advantage of that extra measure of toughness that results from unique *individual design*. This means that each part of each Bucyrus-Erie crane is perfectly matched to the machine's rated lifting capacity — no part is called upon to do more than it should. The danger of over-stressing gears, shafts, drums, clutches, cables, etc. is reduced to a minimum.

For more information, see the Bucyrus-Erie distributor in your area. Ask him about the all-hydraulic truck-mounted Hydrocrane, too, — a "natural" for scrap recovery.

131E55

** Available as extra equipment on standard 22-B crane at slight additional cost.*



BUCYRUS ERIE

South Milwaukee
Wisconsin

75 YEARS OF SERVICE to Men Who Shape the Earth

Scrap Prices *(Effective Feb. 7, 1956)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	40.00 to 41.00
Machine shop turn	33.00 to 34.00
Mixed bor. and ms. turn	33.00 to 34.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	36.00 to 37.00
Low phos. punch'gs plate	56.00 to 57.00
Heavy turnings	44.00 to 45.00
No. 1 RR. hvy. melting	55.00 to 56.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft and under	67.00 to 68.00
RR. steel wheels	61.00 to 62.00
RR. spring steel	61.00 to 62.00
RR. couplers and knuckles	61.00 to 62.00
No. 1 machinery cast	55.00 to 56.00
Cupola cast	48.00 to 49.00
Heavy breakable cast	45.00 to 46.00

Chicago

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 factory bundles	50.00 to 51.00
No. 1 dealers' bundles	47.00 to 49.00
No. 2 dealers' bundles	38.00 to 39.00
Machine shop turn	27.00 to 28.00
Mixed bor. and turn	29.00 to 30.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. forge crops	57.00 to 58.00
Low phos. punch'gs plate	54.00 to 55.00
Low phos. 3 ft and under	53.00 to 54.00
No. 1 RR. hvy. melting	51.00 to 52.00
Scrap rails, random lgth	61.00 to 62.00
Rerolling rails	67.00 to 68.00
Rails 2 ft and under	66.00 to 67.00
Locomotive tires, cut	56.00 to 57.00
Cut bolsters & side frames	57.00 to 58.00
Angles and splice bars	64.00 to 65.00
RR. steel car axles	64.00 to 65.00
RR. couplers and knuckles	57.00 to 58.00
No. 1 machinery cast	52.00 to 53.00
Cupola cast	49.00 to 50.00
Heavy breakable cast	41.00 to 42.00
Cast iron brake shoes	38.00 to 39.00
Cast iron car wheels	47.00 to 48.00
Malleable	59.00 to 60.00
Stove plate	40.00 to 41.00

Philadelphia Area

No. 1 hvy. melting	$51.00 to $52.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 bundles	51.00 to 52.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	36.00 to 37.00
Mixed bor. short turn	36.50 to 37.50
Cast iron borings	36.50 to 37.50
Shoveling turnings	38.50 to 39.50
Clean cast chem. borings	41.00 to 42.00
Low phos. 5 ft and under	55.00 to 56.00
Low phos. 2 ft and under	57.00 to 58.00
Low phos. punch'gs	57.00 to 58.00
Elec. furnace bundles	54.00 to 55.00
Heavy turnings	48.00 to 49.00
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
Rails 18 in. and under	66.00 to 67.00
Cupola cast	49.00 to 50.00
Heavy breakable cast	53.00 to 54.00
Cast iron car wheels	58.00 to 59.00
Malleable	66.50 to 67.50
Unstripped motor blocks	39.00 to 40.00
No. 1 machinery cast	54.00 to 55.00

Cleveland

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 bundles	50.00 to 51.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	50.00 to 51.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	34.50 to 35.50
Cut struct'r'l & plates, 2 ft & under	59.00 to 60.00
Drop forge flashings	50.50 to 51.50
Low phos. punch'gs, plate	50.50 to 51.50
Foundry steel, 2 ft & under	54.00 to 55.00
No. 1 RR. heavy melting	51.00 to 52.00
Rails 2 ft and under	71.00 to 72.00
Rails 18 in. and under	72.00 to 73.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast	57.00 to 58.00
No. 1 machinery cast	55.00 to 56.00
Stove plate	52.00 to 53.00
Malleable	58.00 to 59.00

Youngstown

No. 1 hvy. melting	$53.00 to $54.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 bundles	53.00 to 54.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	30.00 to 31.00
Shoveling turnings	35.50 to 36.50
Cast iron borings	35.50 to 36.50
Low phos. plate	54.00 to 55.00

Buffalo

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 busheling	45.00 to 46.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	54.00 to 55.00
Scrap rails, random lgth.	51.00 to 52.00
Rails 2 ft and under	65.00 to 66.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	52.00 to 53.00
No. 1 cupola cast	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles, openhearth	44.00 to 45.00
No. 2 bundles	32.00 to 33.00
New busheling	44.00 to 45.00
Drop forge flashings	43.50 to 44.50
Machine shop turn.	20.00 to 21.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	23.00 to 24.00
Low phos. punch'gs, plate	45.00 to 46.00
No. 1 cupola cast	44.00 to 45.00
Heavy breakable cast	37.00 to 38.00
Stove plate	38.00 to 39.00
Automotive cast	48.00 to 49.00

St. Louis

No. 1 hvy. melting	$41.50 to $42.50
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	43.00 to 44.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	26.00 to 27.00
Cast iron borings	28.00 to 29.00
Shoveling turnings	30.00 to 31.00
No. 1 RR. hvy. melting	49.00 to 50.00
Rails, random lengths	58.50 to 59.50
Rails 18 in. and under	65.00 to 66.00
Locomotive tires uncut	55.50 to 56.50
Angles and splice bars	58.00 to 59.00
Std. steel car axles	60.00 to 61.00
RR. specialties	54.00 to 55.00
Cupola cast	49.00 to 50.00
Heavy breakable cast	40.00 to 41.00
Cast iron brake shoes	38.00 to 39.00
Stove plate	40.00 to 41.00
Cast iron car wheels	47.00 to 48.00
Rerolling rails	63.00 to 64.00
Malleable	50.00 to 51.00
Unstripped motor blocks	40.00 to 41.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$41.00 to $41.50
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles	41.00 to 41.50
No. 2 bundles	31.00 to 31.50
No. 1 busheling	41.00 to 41.50
Elec. furnace, 3 ft & under	42.00 to 43.00
Machine shop turn.	26.00 to 26.50
Mixed bor. and short turn.	27.00 to 28.00
Shoveling turnings	29.00 to 29.50
Clean cast chem. borings	27.00 to 28.00
No. 1 machinery cast	44.50 to 45.50
Mixed cupola cast	39.00 to 40.00
Heavy breakable cast	41.00 to 42.00
Stove plate	37.00 to 38.00
Unstripped motor blocks	26.00 to 27.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	39.00 to 40.00
No. 2 bundles	32.00 to 33.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	26.00 to 27.00
Clean cast chem. borings	32.00 to 33.00
No. 1 machinery cast	49.00 to 50.00
Mixed yard cast	46.00 to 47.00
Charging box cast	46.00 to 47.00
Heavy breakable cast	46.00 to 47.00
Unstripped motor blocks	31.00 to 32.00

Birmingham

No. 1 hvy. melting	$43.00 to $44.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles	43.00 to 44.00
No. 2 bundles	32.00 to 33.00
No. 1 busheling	43.00 to 44.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	19.00 to 20.00
Electric furnace bundles	46.00 to 47.00
Bar crops and plate	51.00 to 52.00
Structural and plate, 2 ft	51.00 to 52.00
No. 1 RR hvy. melting	51.00 to 52.00
Scrap rails, random lgth.	59.00 to 60.00
Rails, 18 in. and under	64.00 to 65.00
Angles & splice bars	57.00 to 58.00
Rerolling rails	62.00 to 63.00
No. 1 cupola cast	47.50 to 48.50
Stove plate	46.00 to 47.00
Charging box cast	32.00 to 33.00
Cast iron car wheels	39.00 to 40.00
Unstripped motor blocks	39.00 to 40.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$46.00 to $47.00
No. 2 hvy. melting	39.50 to 40.50
No. 1 bundles	46.00 to 47.00
No. 2 bundles	36.50 to 37.50
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	30.00 to 31.00
Low phos. 18 in. & under	55.00 to 56.00
Rails, random lengths	59.00 to 60.00
Rails, 18 in. and under	66.00 to 67.00
No. 1 cupola cast	46.00 to 47.00
Hvy. breakable cast	43.00 to 44.00
Drop broken cast	55.00 to 56.00

San Francisco

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	35.00
No. 1 bundles	39.00
No. 2 bundles	32.00
No. 3 bundles	25.00
Machine shop turn.	20.00 to 23.00
Cast iron borings	20.00
No. 1 RR. hvy. melting	40.00
No. 1 cupola cast	50.00

Los Angeles

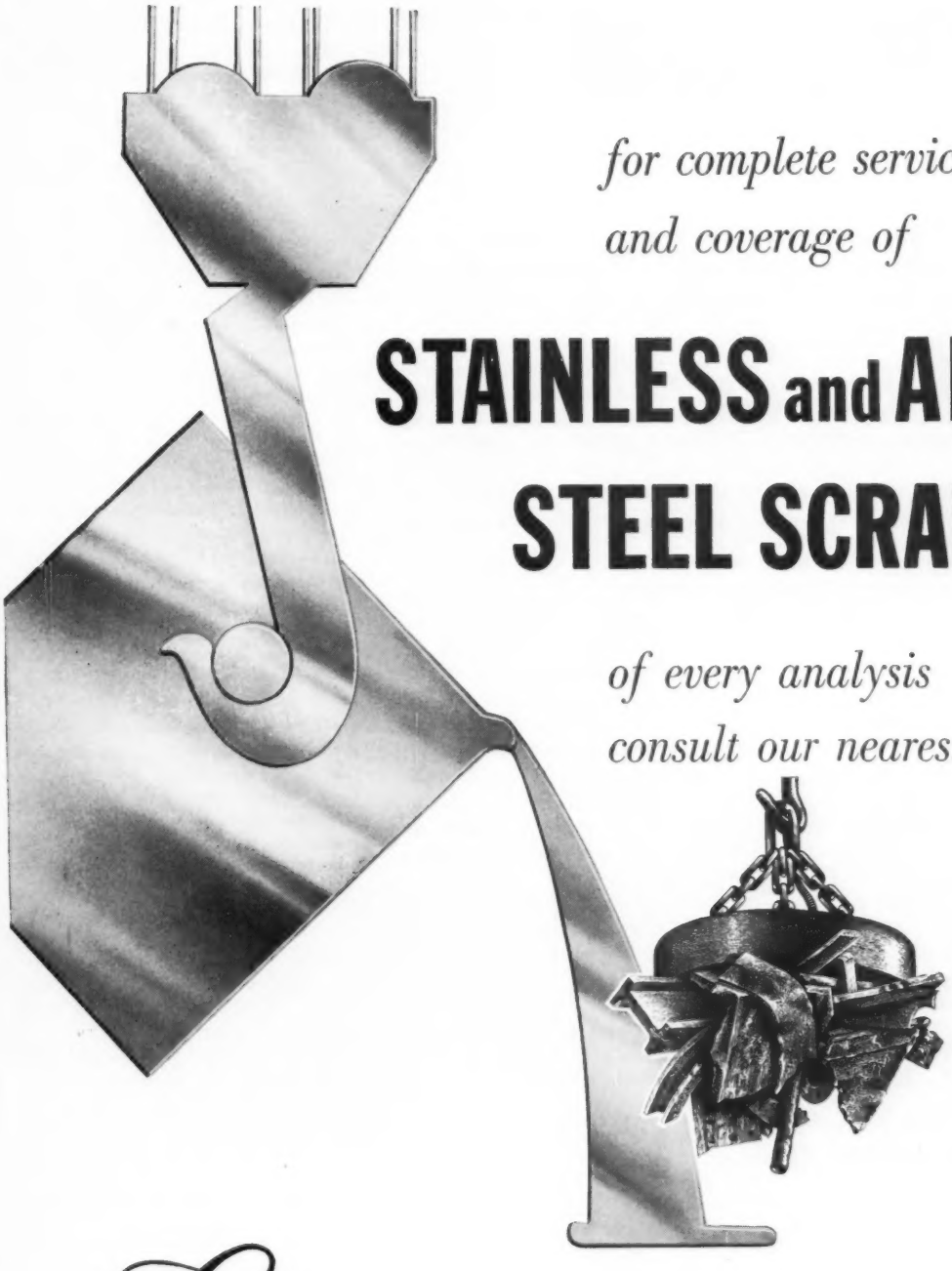
No. 1 hvy. melting	$42.00
No. 2 hvy. melting	36.00
No. 1 bundles	39.00
No. 2 bundles	32.00
No. 3 bundles	25.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	42.00
No. 1 RR. hvy. melting	42.00
No. 1 cupola cast	46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	32.00
No. 3 bundles	25.00
No. 1 cupola cast	45.00
Mixed yard cast	45.00

Hamilton, Ont.

No. 1 hvy. melting	$45.50
No. 2 hvy. melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	39.50
Bushelings	35.50
Bush., new fact., prep'd	43.50
Bush., new fact., unprep'd.	39.50
Machine shop turn.	18.00
Short steel turn.	27.50
Mixed bor. and turn.	$16.00 to 19.00
Rails, rerolling	53.50
Cast scrap	42.00 to 45.00



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IMPORT & EXPORT – **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. • *Cable Address:* **FORENTRACO**

Implications of Tin Talks

Malayan leader in London asking independence . . . Future of world tin market may depend on result . . . Chinese-backed Communists ready for a wrong move.

◆ THE LONG RANGE future of the straits tin market well may depend on the outcome of the current conference between the British Colonial Secretary and Tenghu Abdul Rahman, Chief Minister of the Federation of Malaya.

In 1955 Malaya produced 61,400 long tons of tin, about 37 pct of the entire output of the free world. And this is not indicative of Malaya's full potential. For a number of years she has been fighting a terrorist war with Communists, restricting further expansion.

Finally at the end of last year, Rahman, first popularly elected head of the Malayan government, won a diplomatic victory over Chin Peng, head of the Communist guerillas.

Now Rahman is in London pleading his people's case, full and complete independence for Malaya. Prematurely granted this could be disastrous. And yet if not enough action is taken along this line, it would nullify Rahman's victory at the conference table.

The Communist propaganda machine has been giving as their reason for violence, freedom from British control. By permitting free Malayan elections which brought Rahman to power, the British spiked Chin Peng's verbal guns.

But if Chen receives orders from Peking he is ready to move. And effectively so, because arms, ammunitions and supplies will no doubt accompany the orders. Only 42 pct of the population live in "white" areas—those considered wholly free of terrorism.

Such orders will not be immediately forthcoming because native troops are at present backed by British, Australian, Rhodesian and Fijiian soldiers.

However, unless the people see significant steps toward shifting control from British to Malayan hands, Chin Peng could stimulate mistrust of the British and Rahman and swing enough popularity to handle even the strong garrison of foreign troops.

There are those who believe that China and Russia can't possibly use all of the tin mined and refined in Malaya. And without the income from her tin, Malaya is a liability financially. However control of a world market in Red hands is undesirable no matter how you look at it.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in January based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper		Straits tin, New York	104.815
Del'd Conn. Valley	43.00	Zinc, E. St. Louis	13.44
Lake copper, delivered	43.00	Lead, St. Louis	15.96

Note: Quotations are going prices

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Feb. 1	Feb. 2	Feb. 3	Feb. 4	Feb. 6	Feb. 7
Copper, electro, Conn.	43.00	43.00	43.00	....	43.00	43.00
Copper, Lake, delivered	43.00	43.00	43.00	....	43.00	43.00
Tin, Straits, New York	100.75	100.50	98.75	....	99.00	99.00*
Zinc, East St Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices. **Tentative*

ALUMINUM . . . Aluminum Company of America reports that the expansion program in its Texas smelters is fully five weeks ahead of schedule. In production are expanded potline facilities at Point Comfort. At Rockdale, two new potlines are set to begin operations about March 1. When the project is completed it will boost Alcoa's output by 75,000 tons, about 4 pct of the entire industry production.

However, the full impact of the increase may not be felt immediately because drought conditions are forcing temporary production cutbacks at the Alcoa, Tenn., smelter. Drought is also causing reductions in size of imports from Canada.

Nathanael V. Davis, president of Aluminium Ltd. of Canada declared that "the demand on us from the U. S. independents has grown to a point to where it is beyond our capacity to supply." In addition he reports that unprecedented drought in the Saguenay has forced temporary cutbacks there. However, Aluminium Ltd. plans to boost the capacity at other smelters and Mr. Davis believes that despite the drought, "the outlook continues to be one of substantial growth."

Another Davis, D. J., vice president of manufacturing of the Ford Motor Co., has announced that Ford is negotiating for a 130 acre site on which to put a foundry with about 250,000 sq ft of floor space. The plant will be adjacent to Reynolds Metals' Listerhill, Ala., operation and will take delivery of molten aluminum from its neighbor under a contract previously reported. This will save Reynolds cooling time and Ford remelt time and equipment. Production is expected to start by the end of 1957.

MAGNESIUM . . . Shipments of mill products in 1955 jumped 54 pct to 10,586 short tons as compared to only 6,946 in 1954. In addition to the fact that industry demand picked up, the rise was also caused by the fact that the Madison rolling and extrusion mill of Dow Chemical finished its break-in period and went into full production.

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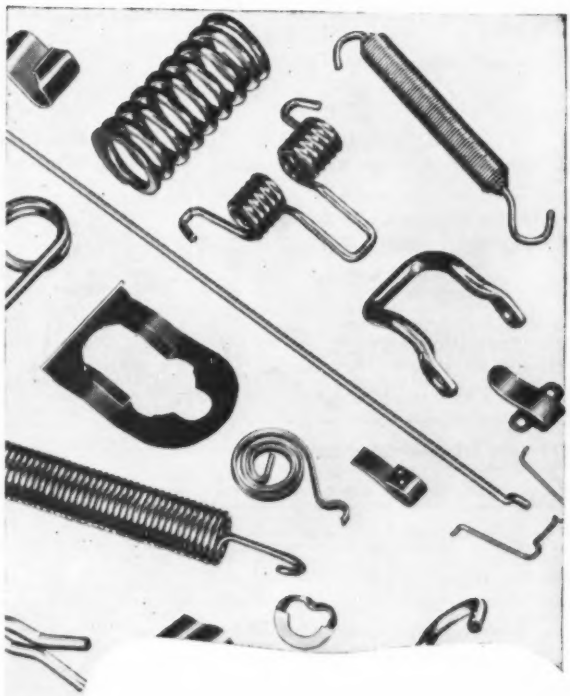

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Nonferrous Prices *(Effective Feb. 7, 1956)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1100, 3003	40.8	38.7	37.5	36.5
5052	48.3	43.4	41.7	39.9
6061-0	45.4	41.2	39.4	39.3

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6- 8	41.6-43.3	56.6-60.2
12-14	42.3-43.7	57.5-61.8
24-26	45.3-45.7	67.7-72.1
36-38	53.6-54.2	90.5-94.3

Screw Machine Stock—2011-T-3

Size"	¼	⅜-⅝	¾-1	1¼-1½
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide, base, 16,000 lb)

Length" →	72	96	120	144
.019 gage	$1.295	$1.727	$2.160	$2.590
.024 gage	1.615	2.162	2.692	3.232

Magnesium

(F.o.b. mill, freight allowed)

Sheet & Plate: FS1-O ¼ in., 61¢; 3/16 in., 62¢; ½ in., 61¢; 0.064 in., 78¢; 0.032 in., 99¢. Specification grade higher. Base, 30,000 lb.

Extruded Round Rod: FS, diam ¼ to 0.311 in., 82.5¢; ⅜ to ¾ in., 65¢; 1¼ to 1.749 in., 60.5¢; 2½ to 5 in., 57¢. Other alloys higher. Base up to ¾ diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: FS. In weight per ft for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 70.7¢; 0.22 to 0.25 lb, 5.9 in., 66.9¢; 0.50 to 0.59 lb, 8.6 in., 63¢; 1.8 to 2.59 lb, 19.5 in., 60.8¢; 4 to 6 lb, 28 in., 57.7¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: FS, 0.049 to 0.057 in. wall thickness: OD ¼ to 5/16 in., $1.625; 5/16 to ⅜ in., $1.475; ½ to ⅝ in., $1.105; 1 to 1½ in., 92.5¢; 0.165 to 0.219 in. wall: OD ⅝ to ¾ in., 75.5¢; 1 to 2 in., 71.5¢; 3 to 4 in., 70.5¢. Other alloys higher. Base OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	63.13	....	63.48
Copper, h-r	58.76	59.11	....
Copper, drawn	....	60.36	....
Low brass	57.75	58.29	....
Yellow brass	53.60	53.54	....
Red brass	59.24	59.18	....
Naval brass	52.83	51.41	48.40
Leaded brass	....	....	48.42
Com. bronze	61.28	61.82	....
Mang. bronze	59.39	53.38	54.94
Phos. bronze	82.51	81.50	....
Muntz metal	53.74	49.55	50.80
Ni silver 10 pct	66.00	68.33	70.68

Beryllium copper Cr, 1.9% Be, Base 2000 lb, f.o.b.

Strip	$1.84
Rod, bar, wire	1.81

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless Tube	122	110	153
Shot, Blocks	...	71	...

Titanium

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $13.10-$13.60; alloy $15.25-$15.75; Plate, HR, commercially pure, $10.50-$11.00; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.50-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.90-$8.15; alloy, $7.90-$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb. freight allowed	24.40
Aluminum pig	22.50
Antimony, American, Laredo, Tex.	33.50
Beryllium copper, per lb conta'd Be	$43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismuth, ton lots	$2.25
Cadmium, del'd	$1.70
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	43.00
Copper, Lake, delivered	43.00
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$100 to $120
Lead, St. Louis	15.80
Lead, New York	16.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig	32.50
ingot	33.25
Magnesium, sticks, 100 to 500 lb	53.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$271 to $275
Nickel electro	64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel	60.75
Palladium, dollars per troy oz.	$23 to $24
Platinum, dollars per troy oz.	$97 to $107
Silver, New York, cents per troy oz.	90.25
Tin, New York	99.00*
Titanium sponge, grade A-1	$3.15 to $3.45
Zinc, East St. Louis	13.50
Zinc, New York	14.00
Zirconium, sponge	$10.00

* Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot	
No. 115	42.00
No. 120	41.25
No. 123	40.50
80-10-10 ingot	
No. 305	45.75
No. 315	44.00
88-10-2 ingot	
No. 210	58.25
No. 215	54.75
No. 245	48.75
Yellow ingot	
No. 405	33.25
Manganese bronze	
No. 421	37.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	32.00-32.75
0.60 copper max.	31.75-32.50
Piston alloys (No. 122 type)	33.25-33.75
No. 12 alum. (No. 2 grade)	30.50-31.00
108 alloy	30.50-31.00
195 alloy	32.50-33.25
13 alloy (0.60 copper max.)	31.75-32.50
AXS-679	30.50-31.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½%	31.00-31.75
Grade 2—92-95%	30.00-30.75
Grade 3—90-92%	29.00-29.75
Grade 4—85-90%	28.50-29.25

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	39	38¼
Yellow brass	29¼	27⅛
Red brass	34⅝	33⅝
Comm. bronze	35¾	35
Mang. bronze	27½	26¾
Yellow brass rod ends	29	....

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	42
No. 2 copper wire	40½
Light copper	38
*Refinery brass	38

* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	42
No. 2 copper wire	40½
Light copper	38
No. 1 composition	34⅛
No. 1 comp. turnings	34
Hvy. yellow brass solids	24⅛
Brass pipe	28
Radiators	26

Aluminum

Mixed old cast	21	—21½
Mixed new clips	22	—23
Mixed turnings, dry	21	—22

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	40	—40½
No. 2 heavy copper and wire	38	—38½
Light copper	36	—36⅛
New type shell cuttings	34½	—35
Auto radiators (unsweated)	23½	—24
No. 1 composition	31	—31½
No. 1 composition turnings	29	—29½
Unlined red car boxes	25	—25½
Cocks and faucets	24½	—25
Clean heavy yellow brass	20	—20½
Brass pipe	25	—25½
New soft brass clippings	26	—26½
No. 1 brass rod turnings	23½	—24

Aluminum

Alum. pistons and struts	18	—18½
Aluminum crankcases	16¾	—17¼
1100 (2S) aluminum clippings		20½
Old sheet and utensils	16¾	—17¼
Borings and turnings	11½	—12
Industrial castings	16¾	—17¼
2024 (24s) clippings	18½	—19

Zinc

New zinc clippings	8½	— 9
Old zinc	6	— 6½
Zinc routings		4¼
Old die cast scrap		3½

Nickel and Monel

Pure nickel clippings	$1.50
Clean nickel turnings	$1.25
Nickel anodes	$1.50
Nickel rod ends	$1.50
New Monel clippings	60
Clean Monel turnings	50
Old sheet Monel	55
Nickel silver clippings, mixed	25
Nickel silver turnings, mixed	21

Lead

Soft scrap lead	12½	—13
Battery plates (dry)	6¾	— 7
Batteries, acid free		4½

Magnesium

Segregated solids	18½	—19
Castings	17½	—18

Miscellaneous

Block tin	83	—84
No. 1 pewter	66	—67
Auto babbitt	43½	—44½
Mixed common babbitt		15¼
Solder joints	20	—20½
Siphon tops		50
Small foundry type	16½	—16⅝
Monotype	14¾	—15¼
Lino. and stereotype	14	—14½
Electrotype	12¼	—12¾
Hand picked type shells	10½	—11
Lino. and stereo. dross	5¾	— 6
Electro. dross	4¾	— 5

STEEL PRICES

(Effective Feb. 7, 1956)

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		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$96.00 *B3*		4.65 *B3*	6.80 *B3*	4.65 *B3*						
	Buffalo, N. Y.	$68.50 *B3*	$84.50 *R3, B3*	$96.00 *R3, B3*	5.45 *B3*	4.65 *B3*	6.80 *B3*	4.65 *B3*	4.325 *R3,B3*	6.25 *B3* 6.25 *R7,S10*	6.425 *B3*	9.10 *B3*		
	Claymont, Del.													
	Harrison, N. J.													13.45 *C11*
	Conshohocken, Pa.								4.375 *A2*	6.30 *A2*	6.425 *A2*			
	New Bedford, Mass.									6.70 *R6*				
	Johnstown, Pa.	$68.50 *B3*	$84.50 *B3*	$96.00 *B3*		4.65 *B3*	6.80 *B3*							
	Boston, Mass.									6.80 *T8*				13.80 *T8*
	New Haven, Conn.									6.70 *D1* *A5*				
	Phoenixville, Pa.					5.15 *P2*		5.15 *P2*						
	Sparrows Pt., Md.								4.325 *B3*	6.25 *B3*	6.425 *B3*	9.10 *B3*		
	Bridgeport, Wallingford, Conn.	$73.50 *N8*	$89.50 *N8*						4.625 *N8*	6.70 *W1*			7.50 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.80 *N7* *A5*				*A5* 13.80 *N7*
MIDDLE WEST	Alton, Ill.								4.50 *L1*					
	Ashland, Ky.								4.325 *A7*					
	Canton-Massillon, Dover, Ohio		$86.50 *R3*	$96.00 *R3*										13.45 *G4*
	Chicago, Ill.	$68.50 *U1*	$84.50 *R3, U1,W8*	$96.00 *R3, U1,W8*	5.45 *U1*	4.60 *U1, W8*	6.75 *U1, Y1*	4.60 *U1*	4.55 *A1* 4.325 *N4,W8*	6.35 *A1,T8*			7.20 *W8*	13.45 *T8*
	Cleveland, Ohio									6.25 *A5,J3*		9.30 *A5*		13.45 *A5*
	Detroit, Mich.			$96.00 *R5*					4.425 *G3,M7*	6.35 *D1,D2, G3,M2,P11*	6.525 *G3*	9.20 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$68.50 *U1*	$84.50 *U1*	$96.00 *U1, Y1*	5.45 *I3*	4.60 *U1, I3*	6.75 *U1, I3*		4.325 *I3, U1,Y1*	6.35 *I3* 6.25 *Y1*	6.425 *I3, U1,Y1*	9.30 *Y1*	7.20 *Y1, U1*	
	Sterling, Ill.								4.425 *N4*					
	Indianapolis, Ind.									6.40 *C5*				
	Newport, Ky.												7.20 *N5*	
	Middletown, Ohio									6.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.	$68.50 *C10*	$84.50 *C10*	$96.00 *C10*					4.325 *S1, R3*	6.25 *S1, R3,T4*	6.425 *S1, R3*	9.10 *S1, R3*	7.20 *S1*	13.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$68.50 *U1, J3*	$84.50 *J3, U1,C11*	$96.00 *U1, C11*	5.45 *U1*	4.60 *U1, J3*	6.75 *U1, J3*	4.60 *U1*	4.325 *P6*	6.25 *S7,B4*			7.20 *S9*	13.45 *S9*
	Portsmouth, Ohio								4.325 *P7*					
	Weirton, Wheeling, Follansbee, W. Va.					4.60 *W3*			4.325 *W3*	6.25 *F3,W3*	6.425 *W3*	9.10 *W3*		
	Youngstown, Ohio		$84.50 *C10*	$96.00 *Y1, C10*		4.60 *Y1*	6.75 *Y1*		4.325 *U1, Y1*	6.25 *Y1,C5*	6.425 *U1, Y1*	9.30 *Y1*	7.20 *U1, Y1*	13.45 *C5*
WEST	Fontana, Cal.	$76.00 *K1*	$92.00 *K1*	$115.00 *K1*		5.25 *K1*	7.40 *K1*	5.40 *K1*	5.075 *K1*	6.80 *K1*	7.525 *K1*		8.85 *K1*	
	Geneva, Utah		$84.50 *C7*			4.60 *C7*	6.75 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.85 *S2*				6.875 *S2*		7.45 *S2*	
	Los Angeles, Torrance, Cal.		$94.00 *B2*	$116.00 *B2*		5.30 *C7, B2*	7.45 *B2*		5.075 *C7, B2*	8.30 *C1*			8.40 *B2*	
	Minnequa, Colo.					4.90 *C6*			5.425 *C6*					
	Portland, Ore.					5.35 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$94.00 *B2*			5.25 *B2, P9*	7.40 *B2*		5.075 *B2, C7*					
	Seattle, Wash.		$98.00 *B2*			5.35 *B2*	7.50 *B2*		5.325 *B2*					
SOUTH	Atlanta, Ga.								4.525 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$68.50 *T2*	$84.50 *T2*			5.10 *C16* 4.60 *R3,T2*	6.75 *T2*		4.325 *R3,T2* 4.825 *C16*		6.425 *T2*			
	Houston, Lone Star, Tex.	$74.50 *L3*	$89.50 *S2*	$101.00 *S2*		4.70 *S2*	6.85 *S2*				6.875 *S2*		7.45 *S2*	

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		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Hollowware Enameling 29 ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 *B3*	5.325 *B3*				6.375 *B3*	7.875 *B3*			5.375 *W6*			
	Claymont, Del.													
	Conshohocken, Pa.	4.375 *A2*	5.375 *A2*				6.425 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.375 *B3*			
	Fairless, Pa.	4.375 *U1*	5.375 *U1*				6.425 *U1*	7.925 *U1*				$9.30 *U1*	$8.00 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 *B3*	5.325 *B3*	5.85 *B3*			6.375 *B3*	7.875 *B3*	8.60 *B3*		5.475 *B3*	$9.30 *B3*	$8.00 *B3*	
	Worcester, Mass.										5.675 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.20 *L1*			
	Ashland, Ky.	4.325 *A7*		5.85 *A7*	5.90 *A7*									
	Canton-Massillon, Dover, Ohio			5.85 *R1, R3*										
	Chicago, Joliet, Ill.	4.55 *A1* 4.325 *W8*					6.375 *U1*				5.025 *N4, R3* 5.375 *A5*			
	Sterling, Ill.										5.375 *N4*			
	Cleveland, Ohio	4.325 *J3, R3*	5.325 *J3, R3*		5.90 *R3*		6.375 *J3, R3*	7.875 *J3, R3*			5.025 *A5*			
	Detroit, Mich.	4.425 *G3, M2*	5.425 *G3* 5.325 *M2*				6.475 *G3*	7.975 *G3*						
	Newport, Ky.	4.325 *N5*	5.325 *N3*	5.85 *N5*										
	Gary, Ind. Harbor, Indiana	4.325 *I3, U1, Y1*	5.325 *I3, U1, Y1*	5.85 *U1, I3*	5.90 *U1, I3*	6.25 *U1*	6.375 *Y1, U1, I3*	7.875 *U1, Y1*			5.025 *Y1*	$9.20 *I3, U1, Y1*	$7.90 *I3, U1, Y1*	6.65 *U1, Y1*
	Granite City, Ill.	4.525 *G2*	5.525 *G2*	6.05 *G2*	6.10 *G2*								$8.00 *G2*	6.75 *G2*
	Kokomo, Ind.			5.95 *C9*							5.475 *C9*			
	Mansfield, Ohio	4.325 *E2*	5.325 *E2*			6.25 *E2*				*E2*				
	Middletown, Ohio		5.325 *A7*	5.85 *A7*	5.90 *A7*	6.25 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.325 *S1, R3, N3*	5.325 *R3, N3*	5.85 *R3* 6.85 *N3*	5.90 *N3*	6.25 *N3*	6.375 *S1, R3*	7.875 *R3*				$9.20 *R3*	$7.90 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 *J3, U1, P6*	5.325 *J3, U1, P6*	5.85 *U1*	5.90 *U1, A7*		6.375 *J3, U1*	7.875 *U1*	8.60 *U1*		5.025 *P6* 5.375 *A5*	$9.20 *J3, U1*	$7.90 *J3, U1*	6.65 *U1*
	Portsmouth, Ohio	4.325 *P7*	5.325 *P7*								5.375 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 *W3, W5*	5.325 *W3, W5, F3*	5.85 *W3, W5*		6.25 *W3, W5*	6.375 *W3*	7.875 *W3*				$9.20 *W3, W5*	$7.90 *W3, W5*	6.65 *F3, W5*
	Youngstown, Ohio	4.325 *U1, Y1*	5.325 *Y1*		5.90 *Y1*		6.375 *U1, Y1*	7.875 *Y1*			5.025 *Y1*			
WEST	Fontana, Cal.	5.075 *K1*	6.425 *K1*				7.125 *K1*	8.975 *K1*						
	Geneva, Utah	4.425 *C7*												
	Kansas City, Mo.										5.625 *S2*			
	Los Angeles, Torrance, Cal.										6.175 *B2*			
	Minnequa, Colo.										5.275 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.025 *C7*	6.275 *C7*	6.60 *C7*							5.675 *C7*	$9.95 *C7*	$8.65 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.325 *R3, T2*	5.325 *T2*	5.85 *R3, T2*			6.375 *T2*			5.625 *R3*	5.025 *R3, T2*	$9.30 *T2*	$8.00 *T2*	
	Houston, Tex.										5.625 *S2*			

† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box.

* COKES: 1.50-lb. add 25¢.

ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.

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		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 *B3*	7.425 *B3*	6.80 *B3*					
	Buffalo, N. Y.	4.65 *B3,R3*	4.65 *B3,R3*	6.30 *B5*	5.575 *B3,R3*	7.425 *B3,B5*	6.80 *B3*	4.50 *B3,R3*				6.60 *W6*
	Claymont, Del.							4.80 *C4*		6.30 *C4*	6.725 *C4*	
	Coatesville, Pa.							4.80 *L4*		6.30 *L4*	6.725 *L4*	
	Conshohocken, Pa.							4.50 *A2*	5.575 *A2*		6.725 *A2*	
	Harrisburg, Pa.							5.10 *P2*	5.575 *C3*			
	Hartford, Conn.			6.40 *R3*		7.725 *R3*						
	Johnstown, Pa.	4.65 *B3*	4.65 *B3*		5.575 *B3*		6.80 *B3*	4.50 *B3*		6.30 *B3*	6.725 *B3*	6.60 *B3*
	Fairless, Pa.	4.80 *U1*	4.80 *U1*		5.725 *U1*							
	Newark, N. J.			6.70 *W10*		7.60 *W10*						
	Camden, N. J.			6.35 *P10*								
	Bridgeport, Putnam, Conn.	4.80 *N8*		6.80 *W10*	5.725 *N8*			4.750 *N8*				
	Sparrows Pt., Md.		4.65 *B3*					4.50 *B3*		6.30 *B3*	6.725 *B3*	6.70 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	4.80 *M7*	4.80 *M7*	6.70 *W11* 6.45 *C14* 6.70 *B5*		7.725 *A5,B5*		4.50 *R3*				6.55 *A5* 6.90 *W6*
	Spring City, Pa.			6.35 *K4*		7.60 *K4*						
MIDDLE WEST	Alton, Ill.	4.85 *L1*										6.425 *L1*
	Ashland, Newport, Ky.							4.50 *A7,N5*		6.30 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.75 *R3*		5.90 *R2,R3*	5.575 *R3,T5*	7.425 *R2,R3, T5*		4.50 *E2*				
	Chicago, Joliet, Ill.	4.65 *U1, N4,W8,R3, P13*	4.65 *N4,R3, P13*	5.90 *L2* 6.25 *B5, W8, W10, A5*	5.575 *U1,R3, W8*	7.425 *A5,W8, W10,L2,B5*		4.50 *U1,W8, I3,A1,R3*	5.575 *U1*	6.30 *U1*	6.725 *U1*	6.25 *A5,R3, N4,W7*
	Cleveland, Ohio	4.65 *R3*	4.65 *R3*	5.90 *C13* 6.25 *A5*		7.425 *A5,C13*	6.80 *R3*	4.60 *J3,R3*	5.575 *J3*		6.725 *R3,J3*	6.25 *A5, C13*
	Detroit, Mich.	4.75 *G3*	4.75 *G3*	5.90 *R5* 6.45 *B5* 6.15 *P3* 6.10 *P8*	5.575 *R5* 5.675 *G3*	7.425 *R5* 7.625 *B5,P3 P8*	6.90 *G3*	4.60 *G3*			6.825 *G3*	
	Duluth, Minn.											6.25 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.65 *I3, U1, Y1*	4.65 *I3, U1, Y1*	5.90 *M5,R3*	5.575 *I3, U1, Y1*	7.425 *M5, R3*	6.80 *U1,I3, Y1*	4.50 *I3, U1,Y1*	5.575 *I3*	6.30 *U1,Y1*	6.725 *U1, I3,Y1*	6.35 *M4*
	Granite City, Ill.							4.70 *G2*				
	Kokomo, Ind.											6.70 *C9*
	Sterling, Ill.	4.75 *N4*	4.75 *N4*									6.60 *N4*
	Niles, Warren, Ohio Sharon, Pa.	4.65 *R3,C10*		5.90 *C10*	5.575 *C10*	7.425 *C10*	6.80 *R3*	4.50 *S1,R3*		6.30 *S1*	6.725 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.65 *J3, U1, C11*	4.65 *J3, U1*	6.25 *A5,C8, C11,J3, W10,B4,R3*	5.575 *U1,C11*	7.425 *A5,C11, W10,C8,R3*	6.80 *J3, U1*	4.50 *J3, U1*	5.575 *U1*	6.30 *U1*	6.725 *J3, U1*	6.60 *A5,J3, P6*
	Portsmouth, Ohio											6.60 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.65 *W3*						4.50 *W3,W5*				
	Youngstown, Ohio	4.65 *U1, Y1, C10,R3*	4.65 *U1, Y1, R3*	5.90 *Y1, U1*	5.575 *U1, Y1, C10*	7.425 *Y1,C10 F2*	6.80 *U1, Y1*	4.50 *U1, Y1, R3*		6.30 *Y1*	6.725 *Y1*	6.25 *Y1*
WEST	Emeryville, Cal.	5.40 *J5*	5.40 *J5*									
	Fontana, Cal.	5.35 *K1*	5.35 *K1*		6.625 *K1*		7.50 *K1*	5.15 *K1*		6.95 *K1*	7.375 *K1*	
	Geneva, Utah							4.50 *C7*			6.725 *C7*	
	Kansas City, Mo.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*					6.85 *S2*
	Los Angeles, Torrance, Cal.	5.35 *B2,C7*	5.35 *B2,C7*	7.35 *R3*	6.625 *B2*		7.50 *B2*				7.625 *B2*	7.55 *B2*
	Minnequa, Colo.	5.10 *C6*	5.10 *C6*					5.55 *C6*				6.50 *C6*
	Portland, Ore.	5.40 *O2*	5.40 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.35 *C7* 5.40 *B2,P9*	5.35 *C7* 5.40 *B2,P9*				7.55 *B2*					7.20 *C7*
	Seattle, Wash.	5.40 *B2,P12, N6*	5.40 *B2,P12*				7.55 *B2*	5.40 *B2*		7.20 *B2*	7.625 *B2*	
SOUTH	Atlanta, Ga.	4.85 *A8*	4.85 *A8*									6.45 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.65 *T2,R3* 5.15 *C16*	4.65 *T2,R3* 5.15 *C16*				6.80 *T2*	4.50 *T2,R3*			6.725 *T2*	6.25 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*	4.65 *L3* 4.60 *S2*		6.40 *S2*	6.825 *S2*	6.85 *S2*

Steel Prices *(Effective Feb. 7, 1956)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ in.		¾ in.		1 in.		1¼ in.		1½ in.		2 in.		2½–3 in.		2 in.		2½ in.		3 in.		3½–4 in.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Youngstown *R3*	18.50	1.25	21.50	5.25	24.00	8.75	26.50	10.00	27.00	11.00	27.50	11.50	29.00	11.75								
Fontana *K1*	7.00	+2.25	10.00	+6.25	12.50	+4.75	15.00	+3.00	15.50	+2.00	16.00	+1.50	17.50	+0.75								
Pittsburgh *J3*	18.50	1.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. *L1*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Sharon *M3*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Fairless *N2*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Pittsburgh *N1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling *W5*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Wheatland *W4*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Youngstown *Y1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor *Y1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.00	26.00	11.50	26.50	12.00	28.00	11.75								
Lorain *N2*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Youngstown *R3*	23.00	7.25	27.00	11.25	29.00	14.75	29.50	14.00	30.00	15.00	30.50	15.50	31.00	14.75								
Fairless *N2*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Fontana *K1*	11.50		15.50		17.50		18.00		18.50		19.00		19.50									
Pittsburgh *J3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Alton, Ill. *L1*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Sharon *M3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Pittsburgh *N1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Wheeling *W5*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Wheatland *W4*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Youngstown *Y1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Indiana Harbor *Y1*	22.00	8.25	26.00	12.25	28.00	15.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Lorain *N2*	21.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75

Threads only, buttweld and seamless 2½ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb, East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2 in., 1½ pt.; 2½ and 3-in., 1 pt. e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

(Effective Feb. 7, 1956)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	4	1.5	8	—	.96
6	4	3	6	—	1.35
6	4	2	5	—	1.105

High-carbon chromium ..... .77
Oil hardened manganese ..... .43
Special carbon ..... .39
Extra carbon ..... .33
Regular carbon ..... .275

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b

	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	304	30.30	33.15	36.05	32.50
	316	35.50	38.45	41.40	47.60
	321	32.00	34.85	37.75	37.25
	347	34.40	37.90	41.40	48.25
	405	25.80	29.60	33.35	.....
	410, 430	25.30	29.10	32.85	.....

CR Strip (*S9*) Copper, 10 pct, 2 sides, 33.00; 1 side, 30.00.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	8.40	8.60	.....
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% *Fe natural content, delivered lower Lake ports. Prices for* 1956 *season. Freight changes for buyer's account.*

	Gross Ton
Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.10
Mesabi, nonbessemer	10.95
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Cal	Woven Wire Fence 9-15½ ga. Cal	17½" Fence Posts Cal	Single Loop Bale Ties Cal	Galv. Barbed and Twisted Barbless Wire Cal	Merch. Wire Annld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	152	162	...	173	175	7.40	7.80
Aliquippa, Pa. *J3*	152	162	...	...	...	7.40	7.80
Atlanta *A8*	154	167	...	175	180	7.50	8.025
Bartonville *K2**	154	168	...	175	181	7.50	8.075
Buffalo *W8*	...	...	...	...	...	7.40	7.80
Chicago, Ill. *N4***	152	166	...	173	179	7.40	8.00
Cleveland *A6*	157	...	...	...	...	7.40	.....
Cleveland *A5*	...	...	...	...	...	7.40	.....
Crawfordsville *M4**	154	167	...	175	175	7.50	8.05
Donora, Pa. *A5*	152	162	...	173	175	7.40	7.80
Duluth *A5*	152	162	...	173	175	7.40	7.80
Fairfield, Ala. *T2*	152	162	...	173	175	7.40	7.80
Galveston *D4*	157	...	...	...	...	...	.....
Houston *S2*	157	170	...	...	180	7.65	8.05
Johnstown, Pa. *B3**	152	166	...	...	175	7.40	7.80
Joliet, Ill. *A5*	152	162	...	173	175	7.40	7.80
Kokomo, Ind. *C9*	154	154	...	175	177	7.50	7.90
Los Angeles *B2**	...	...	...	...	...	8.35	8.925
Kansas City *S2*	157	167	...	178	180	7.65	8.05
Minnequa *C6*	157	167	162	178	180	7.65	8.05
Monessen *P6*	152	162	...	...	...	7.40	7.80
Moline, Ill. *R3*	...	162	162	...	...	...	.....
Pittsburg, Cal. *C7*	171	185	...	...	195	8.35	8.75
Portsmouth *P7*	...	...	...	...	...	7.40	.....
Rankin, Pa. *A5*	152	162	...	...	175	7.40	7.80
So. Chicago *R3*	152	162	157	173	175	7.40	7.80
S. San Francisco *C6*	...	...	...	197	195	8.35	8.75
Sparrows Pt. *B3**	154	...	...	175	181	7.50	8.075
Struthers, O. *Y1*	...	...	...	...	...	7.40	7.90
Worcester *A5*	158	...	...	...	...	7.70	.....
Williamsport, Pa. *S5*	...	...	160	...	...	.....	.....

Galvanized products computed with zinc at 5¢ per lb. Exceptions: *zinc at 12.5¢ per lb; **13¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bristol, Conn. *W12*	...	...	10.80	12.95	15.65
Buffalo, N. Y. *R7*	7.80	8.95	10.50	12.65	15.35
Carnegie, Pa. *S9*	...	9.05	10.60	12.75	15.35
Cleveland *A5*	7.10	9.05	10.60	12.75	15.45
Detroit *D1*	7.20	9.15	10.70	12.85	.....
Detroit *D2*	7.20	9.15	10.70	...	.....
Harrison, N. J. *C11*	...	...	10.90	13.05	15.75
Indianapolis *C5*	7.15	9.10	10.58	12.65	15.35
New Castle, Pa. *B4*	7.00	8.95	10.50	12.65	.....
New Haven, Conn. *D1*	7.55	9.35	10.90	13.05	.....
Pawtucket, R. I. *N7*	7.65	9.35	10.90	13.05	15.75
Pittsburgh *S7*	7.10	9.05	10.60	12.75	15.45
Riverdale, Ill. *A1*	7.20	9.05	10.60	12.75	15.45
Sharon, Pa. *S1*	7.10	9.05	10.60	12.75	15.45
Trenton *R4*	...	...	...	...	.....
Wallingford *W1*	7.45	9.25	10.80	12.95	15.65
Warren, Ohio *T4*	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. *W3*	7.10	8.95	10.50	...	.....
Worcester, Mass. *A5*	7.65	9.35	10.90	13.05	15.75
Youngstown *C5*	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D
Babcock & Wilcox	2	13	30.87	36.51	29.93	.....
	2½	12	41.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
National Tube	2	13	30.87	36.51	29.93	.....
	2½	12	42.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
Pittsburgh Steel	2	13	30.87	36.51	.....	.....
	2½	12	41.57	49.16	.....	.....
	3	12	47.99	56.76	.....	.....
	3½	11	56.03	66.27	.....	.....
	4	10	74.41	88.00	.....	.....

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	‡ City Delivery Charge	Sheets Hot-Rolled	Sheets Cold-Rolled	Sheets Galvanized (10 gage)	Strip Hot-Rolled	Strip Cold-Rolled	Plates	Shapes Standard Structural	Bars Hot-Rolled	Bars Cold-Finished	Alloy Bars Hot-Rolled 4615 As rolled	Alloy Bars Hot-Rolled 4140 Annealed	Alloy Bars Cold-Drawn 4615 As rolled	Alloy Bars Cold-Drawn 4140 Annealed
Baltimore	$.10	7.03	8.32	8.37	7.65	.....	7.21	7.93	7.61	8.62	14.38	13.44–13.96	16.36	16.29–16.49
Birmingham	.15	6.80	7.93	8.85	7.06	.....	6.99	7.28	7.08	9.35	.....	.....	.....	.....
Boston	.10	7.85	8.91	10.37	8.06	.....	7.99	8.23	7.97	9.77	.....	13.60	.....	16.70
Buffalo	.30	7.20	8.40	10.16	7.50	.....	7.50	7.75	7.50	8.25	.....	13.45	.....	16.50
Chicago	.25	7.15	8.29	9.80	7.36	.....	7.29	7.58	7.42	7.90	.....	13.20	.....	16.30
Cincinnati	.25	7.24	8.23	9.10	7.45	.....	7.74	7.90	7.51	8.15	13.59	13.29	16.44	16.39
Cleveland	.30	7.13	8.24	8.95	7.31	.....	7.62	7.76	7.33	8.00	13.41	13.11	16.26	16.21
Denver		8.60	10.76	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97
Detroit	.25	7.32	8.43	8.93	7.49	.....	7.73	7.90	7.55	.....	13.70	13.40	16.55	16.50
Houston		7.85	8.75	10.49	8.15	.....	7.80	8.20	8.25	9.85–9.95	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	.....	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.15	10.10	11.10	8.45	.....	8.65	8.40	8.25	11.00	.....	14.45	.....	18.00
Memphis	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....
Milwaukee	.25	7.24	8.48	8.89	7.45	.....	7.38	7.75	7.51	8.09	.....	13.29	.....	16.39
New Orleans	.15	7.20	8.35	.....	7.45	.....	7.40	7.70	7.50	9.55	.....	.....	.....	.....
New York	.10	7.71	8.94	9.69	8.27	.....	7.96	8.19	8.21	9.68	.....	13.53	.....	16.63
Norfolk	.20	7.25	.....	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....
Philadelphia	.10	7.29	8.52	9.47	7.77	.....	7.47	7.84	7.78	8.56	.....	13.31	.....	16.41
Pittsburgh	.25	7.13	8.24	9.40	7.31	9.00	7.45	7.43	7.27	8.00	13.35	13.05	16.20	16.15
Portland		7.80–8.60	8.80–10.15	10.65	8.00	7.95	7.75	7.85–8.15	7.95	12.20	.....	15.00	.....	17.50
Salt Lake City	.20	.....	10.60	.....	9.35	.....	.....	9.20	9.15	.....	.....	.....	.....	.....
San Francisco	.10	8.20	9.75	10.25	8.45	.....	8.15	8.35	8.25	11.55	.....	14.45	.....	18.00
Seattle	.00	8.55	10.40	10.80	8.65	.....	8.20	8.30	8.40	.....	.....	14.65	.....	.....
St. Louis	.25	7.44	8.68	9.54	7.65	.....	7.58	7.98	7.71	8.44	.....	13.49	.....	16.59
St. Paul	.25	7.46	8.59–9.14	9.16	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: (1) 1500 to 9999 lb. (2) 1000 lb or over. (3) $.25 delivery. (4) 1000 to 1999 lb, $.25 delivery.

* Plus analysis charge. ‡ Deduct for country delivery.

(Effective Feb. 7, 1956)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	4.725	5.65	5.825	....	....	....	....
So. Chicago *R3*	....	....	....	7.90	....	....	....
Bonley *T2*	4.725	5.65	....	....	....	....	....
Fairfield *T2*	....	5.65	....	7.90	....	5.625	....
Gary *U1*	4.725	5.65	....	....	....	5.625	....
Ind. Harbor *I3*	4.725	....	5.825	7.90	....	5.625	....
Ind. Harbor *Y1*	....	....	....	7.90	....	....	....
Johnstown *B3*	....	5.65	....	....	....	....	....
Joliet *U1*	....	5.65	5.825	....	....	....	....
Kansas City *S2*	....	....	....	7.90	....	....	....
Lackawanna *B3*	4.725	5.65	5.825	....	....	5.625	....
Lebanon *B3*	....	....	....	....	....	....	12.15
Minnequa *C6*	4.725	6.15	5.825	7.90	....	5.625	12.15
Pittsburgh *O1*	....	....	....	....	11.90	....	12.15
Pittsburgh *P5*	....	....	....	....	....	....	12.15
Pittsburgh *J3*	....	....	....	7.90	....	....	....
Seattle *B2*	....	....	....	8.40	....	5.775	12.65
Steelton *B3*	4.725	....	5.825	....	....	5.625	....
Struthers *Y1*	....	....	....	7.90	....	....	....
Torrance *C7*	....	....	....	....	....	5.775	....
Williamsport *S5*	....	5.65	....	....	....	....	....
Youngstown *R3*	....	....	....	7.90	....	....	....

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. .....$14.00 to $14.50
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. .....$16.00 to $16.50
Foundry, oven coke

Buffalo, del'd	$28.08
Chicago, f.o.b.	25.75
Detroit, f.o.b.	26.25
New England, del'd	28.55
Seaboard, N. J., f.o.b.	25.50
Philadelphia, f.o.b.	25.00
Swedeland, Pa., f.o.b.	25.00
Plainesville, Ohio, f.o.b.	25.50
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, f.o.b.	25.65
Lone Star, Tex., f.o.b.	19.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100, 110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
6	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	60	12.10
2½	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Cast elliptical, 18 in. or longer, 5000 lb lots	58.92
Electrodeposited	55.25
Brass, 80-20, ball anodes, 2000 lb or more	58.00
Zinc, ball anodes, 2000 lb lots (for elliptical add 2¢ per lb)	20.75
Nickel, 99 pct plus, rolled carbon (rolled depolarized add 3¢ per lb)	90.50
Cadmium	$1.70
Tin, ball anodes and elliptical	$1.06 to $1.10

Chemicals

(Cents per lb, fob shipping point)

Copper cyanide, 100 lb drum	83.50
Copper sulphate, 5 or more 100 lb bags, per cwt	18.15
Nickel salts, single, 4-100 lb bags	33.25
Nickel chloride, freight allowed, 300 lbs	43.50
Sodium cyanide, domestic, fob N. Y. 1 to 4 200 lb drums (Philadelphia add .50 per lb)	21.55
Zinc cyanide, 100 to 900 lb	55.55
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 1 to 20 100 lb drums	31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts Full case Quantity	Full case 20,000 lb. or more
½ in. & smaller x 6 in. & shorter	61	63
Larger than ½ in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Plow bolts	61	63

Nuts, Hex., H.P., reg. & hvy.

¾" or smaller	64	66
⅞" to 1¼" inclusive	63	65
1⅜" to 1½" inclusive	65	67
1⅝" and larger	61	63

C.P Hex regular & hvy

¾" or smaller	64	66
⅞" and larger	61	63

Hot Galv. Nuts (all types)

1½" or smaller	44	47

Finished, Semi-finished, Hex. Nuts

¾" and smaller	66	66
⅞" and larger	63	63

Add 25% for less than case or keg quantity.

Rivets

	Base per 100 lb
½ in. and larger	$9.95
	Pct Off List
7/16 in. and smaller	32

Cap Screws

	Discount Bright Treated	H.C. Heat
New std. hex head, packaged ¼" thru ½" diam. x 6" and shorter	34	20
9/16 and ⅝" x 6" and smaller and shorter	31	16
¾", ⅞", 1" x 6" and shorter	9	+11
New std. hex head, bulk* ¼" thru ½" diam. x 6" and shorter	49	41
9/16" and ⅝" diam. x 6" and shorter	43	39
¾", ⅞", 1" x 6" and shorter	31	20

*Minimum quantity per item:
15,000 pieces ¼", 5/16", ⅜" diam.
5,000 pieces 7/16", ½", 9/16", ⅝" diam.
2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

		Discount Mach. Screws	Stove Bolts
Packaged, package list		27	38
Bulk, bulk list			
	Quantity		
¼-in. diam. & under	25,000-200,000	20	61
5/16-in. diam. & larger	15,000-100,000	20	61
All diam. over 3 in. long	5,000-100,000	—	61

Machine Screw & Stove Bolt Nuts

		Discount Hex	Square
Packaged, package list		24	27
Bulk, bulk list			
	Quantity		
⅜-in. diam. & smaller	25,000-200,000	18	20

CAST IRON WATER PIPE INDEX

Birmingham	109.3
New York	121.5
Chicago	128.9
San Francisco-L. A.	131.1

Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa., (except Salina, Pa., add $5.00)	$123.00
No. 1 Ohio	....
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	18.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$128.00
Childs, Hays, Pa.	138.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O.	145.00
Curtner, Calif.	163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays, Pa.	24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	22.00
Silica cement, net ton, bulk, Utah and Calif.	32.00

Chrome Brick

Per net ton

Standard chemically bonded, balt.	$91.00
Standards chemically bonded, Curtner, Calif.	101.25
Burned, Balt.	85.00

Magnesite Brick

Standard Baltimore	$114.00
Chemically bonded, Baltimore	102.00

Grain Magnesite

St. ¼-in. grains

Domestic, f.o.b. Baltimore in bulk fines removed	$64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	40.00
in sacks	46.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$15.00
Midwest	15.60
Missouri Valley	14.00

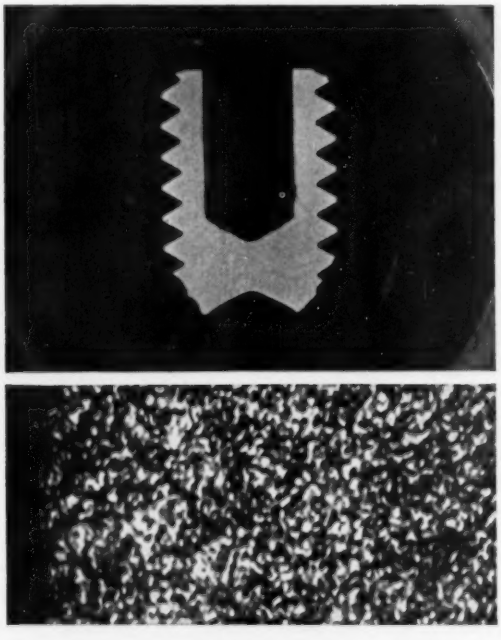
METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

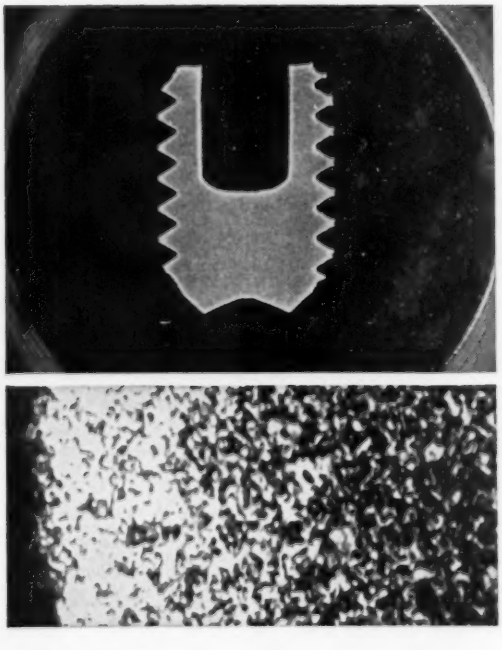
Swedish sponge iron c.l.f. New York, ocean bags	9.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge iron, 98+% Fe, carload lots	9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe	86.0¢ to $1.55
Aluminum freight allowed	34.50¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	61.50¢
Copper, reduced	61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd	$3.60
Lead	7.50¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	$3.00 to $3.25
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed, #80	$1.18
Silicon	43.50¢
Solder powder 7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	99.0¢
Stainless steel, 316	$1.32
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$4.50
Zinc, 10 ton lots	18.75¢ to 32.50¢

New heat-treatment methods help High-Torque Unbrako socket set screws withstand up to 40% Higher Torques

UNBRAKO SET SCREW



ORDINARY SET SCREW



—you can set them and forget them

Research had proved that the tighter you seat a set screw the better it works. So we developed a set screw that could be tightened tighter than ever before without damaging the screw. One of the problems was developing new methods of heat treatment to eliminate decarburization. Decarb of course plays havoc with a screw. Put a wrench in the socket and you ream it. Run the screw into a tapped hole and you strip its threads. Try to seat it and its point shears off. These photographs are a study in contrasts. The UNBRAKO is clean, its grain uniform. There is no decarburization —the ordinary set screw is suffering from an overdose of it, socket walls, threads and point are full of the telltale white spots.

You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your industrial distributor. Or write STANDARD PRESSED STEEL Co., Jenkintown 17, Pa.

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES
(Inch-Pounds)

SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

STANDARD PRESSED STEEL CO.
UNBRAKO® SOCKET SCREW DIVISION SPS
JENKINTOWN PENNSYLVANIA

Ferroalloy Prices

(Effective Feb. 7, 1956)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk carloads, del'd, 67-71% Cr, .30-1.00% max. Si.

0.02% C	38.50	0.20% C	35.50
0.06% C	36.50	0.50% C	35.25
0.10% C	36.00	1.00% C	34.00
0.15% C	35.75	2.00% C	33.75

4.00-4.50 C, 67.70% Cr, 1-2% Si. ... 26.25
3.50-5.00% C, 57-64% Cr, 2.00-4.00% Si ... 25.00

S. M. Ferrochrome

Contract prices, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	27.35
Ton lots	30.55
Less ton lots	32.05

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 3¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.

30-33% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	23.05
Ton lots	24.95
Less ton lots	25.95

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	19.65
Less ton lots	20.90

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.25
Johnstown, Pa.	10.25
Sheridan, Pa.	10.25
Philo, Ohio	10.25
S. Duquesne	10.25

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	12.50
Ton lots packed	14.70

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$89.50
19 to 21%	3% max.	91.50
21 to 23%	3% max.	94.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, Packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn .. 22.35

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	33.00	35.55	36.75
0.07% max. C	30.95	33.50	34.70
0.15% max. C	29.45	32.00	33.20
0.30% max. C	27.95	30.50	31.70
0.50% max. C	27.45	30.00	31.20
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	24.45	27.00	28.20

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carload bulk	11.50
Ton lots	12.95
Briquet contract basis carloads, bulk, delivered, per lb of briquet	13.15
Ton lots, packed	15.35

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $98.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	22.75	21.45
98% Si, 1% Fe	23.25	21.95

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	7.15
Ton lots, packed	9.75

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

50% Si	12.75	75% Si	15.40
65% Si	14.50	85% Si	17.10
	90% Si	18.50	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.10
Crucible	3.20
High speed steel (Primos)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe, Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo ... $1.34

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Cb plus Ta ... $4.65

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo .. $1.54

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton ... $90.00
10 tons to less carload ... $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.50
Less ton lots ... $1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton ... $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, f.o.b. ... $3.45

Molybdic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa. ... $1.33
bags, f.o.b. Washington, Pa., Langeloth, Pa. ... $1.30

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	17.50¢
Ton lots, packed lump	19.50¢
Less ton lots	20.00¢

Vanadium oxide, 86 - 89% V_2O_5 contract basis, per pound contained V_2O_5 ... $1.33

Zirconium contract basis, per lb of alloy
35-40%, f.o.b. freight allowed, carloads, packed ... 26.25¢
12-15%, del'd, lump, bulk-carloads ... 8.50¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B, 3.14%, Si 40-45%, per lb contained 2 ... $5.25

Bortam, f.o.b. Niagara Falls
Ton lots, per pound ... 45¢
Less ton lots, per pound ... 50¢

Corbortam, Ti 15-21%, B 1-2% Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed
Ton lots per pound ... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50%, max. Al, 0.50% max. C, 1 in. x D, ton lots ... 1.20
F.o.b. Wash., Pa.; 100 lb up

1¢ to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa. freight allowed, 100 lb and over

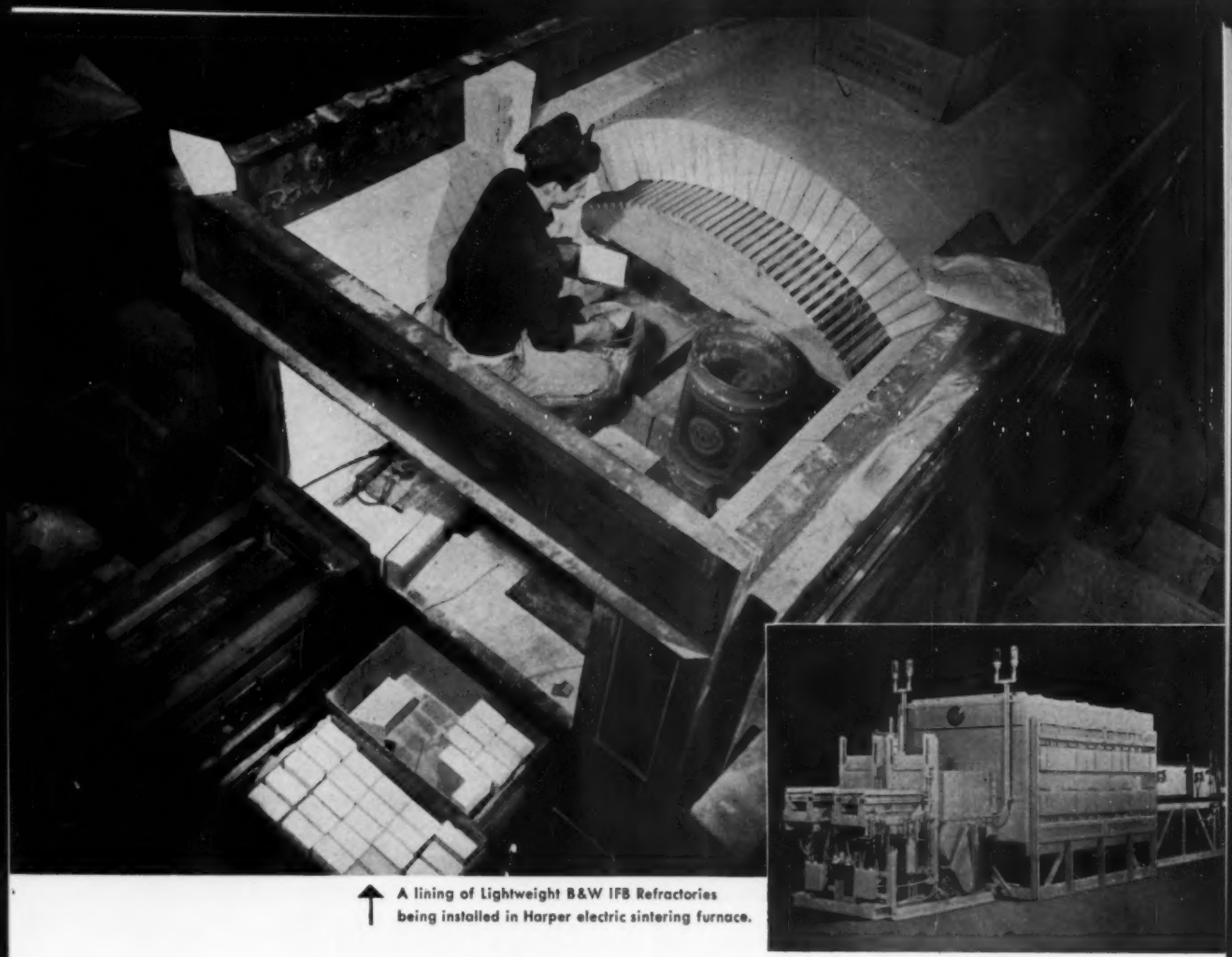
No. 1	$1.05
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.54

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots ... $2.05

Silcaz, contract basis, delivered.
Ton lots ... 45.00¢



A lining of Lightweight B&W IFB Refractories being installed in Harper electric sintering furnace.

Refractories Maintenance Cut Down

ON HARPER ELECTRIC FURNACES AND KILNS

"Furnace linings that don't last as long as they should can shoot our customers' production costs 'sky high' —and take a big bite out of their profits."

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These savings explain why B&W Insulating Firebrick are being used in thousands of applications . . . from the largest industrial furnaces to the smallest kilns. Contact your local B&W Refractories Engineer. He may point the way to new savings in your furnace.

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"Improved" **FLEETWELD 47** for fast, smooth, all-position welding.

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Tool Engineers Issue Preview

FOR READERS . . . the March 8th issue of The IRON AGE will offer dollar-saving ideas that show how to get the most from your metal cutting and metal forming tools:

1 Choosing the Right Equipment. When do you use standard, semi-automatic, or special machines? Tips on buying—delivery time, extras, service, range of performance.

2 What About Automation? Where automation can be applied and to what extent. Pointers on part handling and positioning, use of conveyors.

3 Solving Fixturing Problems. Are you taking advantage of new fixturing materials? How to standardize on fixtures and achieve interchangeability.

4 How to Reduce Cutting Tool Costs. Tell-tale signs of bad design, cutting down on the types you buy, carbon vs. high speed vs. carbide, good sharpening practice.

5 Testing the Piece. How to tell when gage costs are excessive, gage maintenance, gage selection—built-in vs. separate, how quality control can help you.

6 Lubricants and Coolants. Wet vs. dry cutting, buying lubricants and coolants, reclaiming fluid from chips, selecting the right pressures, use of filters and refrigerants.

7 Cutting Maintenance Costs. Advantages of preventive maintenance, tips on spotting weak equipment, fixing maintenance responsibilities, good housekeeping.

FOR ADVERTISERS . . . it offers an opportunity to get more for your advertising dollar by:

1 Inviting Customers and Prospects to visit your exhibit at the ASTE Industrial Exposition.

2 Selling Tool Engineers who won't be able to attend the exposition.

3 Exhibiting in Print those products you are not planning to exhibit at the exposition.

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News of Used and Rebuilt Machinery

Coast Dealers Are Hopping . . . It's "off to a good start" for West Coast used machinery dealers. Business in the major markets here is snappy. Lots of inquiries, plenty of sales, and not too much trouble getting machines to sell.

Demand for late-model machines in good condition has Los Angeles, San Francisco, and Seattle dealers hopping. For big presses and lathes, some dealers are going back East to find what they need. This trend is likely to get stronger as the year moves on.

Steel Shortage Poses Problem . . . There is some worry, however, that steel shortages may put a crimp in business.

One dealer reports, "Fabricators tell us they're not too eager to buy either new or used machines as long as they're not sure of the steel to use them on." Even though a few dealers admit some customers are slowing up their purchases, dealers as a whole aren't taking the threat too seriously.

In Los Angeles, here's what's moving best: big presses and lathes, vertical mills, drill presses, planers and shapers for conversion to profiling and tracing machines, and surface grinders.

A large volume of sheet metal equipment should find its way into southern California metalworking plants this year. Building and electronics industries are leading the pace.

San Francisco Is Active . . . Business is pretty good in the San Francisco Bay Area. It would be still better if steel supplies were more plentiful. Prices are holding firm but some items of good used equipment are scarce. Outstanding among the scarce tools: heavier shears, press brakes, and bending rolls.

Dealers in the Bay Area enter the new year optimistic and feel they should be able to repeat the 1955 performance which wound up with a substantial increase—about 30 pct to 35 pct—over 1954. But the big fly in the ointment is still the steel shortage.

One dealer told THE IRON AGE: "The buying spree touched off by the Chicago Show has spread even to the San Francisco Bay Area. The effects of this are trickling down to the used machinery field. Buyers of new equipment sell their old equipment and the wheel keeps turning around."

What About Seattle? . . . In Seattle, there's brisk demand for late-model tools, made since 1941, of almost all types.

One big company reports all heavy items, except shears, are moving rapidly.

Here's what the customers want most: mills, lathes, radials, and horizontal boring mills. And the latter, incidentally, have all but replaced shapers in Seattle.

Back Orders Mounting . . . Geared head lathes, such as the Lodge-Shipley's, are sold as fast as they become available. Monarch and American lathes appear at a premium, and Giddings and Lewis' boring mills are also tight.

New tools in the main are on back order from Eastern sources. And the number of back orders is on the upswing.

MDNA Has Lapel Pins . . . Machinery Dealers National Association headquarters at 1346 Connecticut Ave., N.W., Washington 6, D. C., now has a batch of handsome sterling silver lapel pins on hand which can be yours at $2 per pin. Master dies for stamping the pin were earlier presented to the MDNA Board of Directors by Max Leach of H. Leach Machinery Co. John Bekolay of B & H Machine Sales, Detroit, has been instrumental some years ago in designing a pin all members can take pride in wearing.

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1⅝"x1¾"x¾" Niagara No. 3
4½"x4½"x⅝" Amplex PRR Horizontal

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#123P-66 Logemann, Charging Box 66x13x24. Produces Bale 125 to 150 lbs.
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8' x 3/16" Milton Slip Roll Forming Machine
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12' x ⅜" Cleveland Pyramid Type
16' x ⅛" Bertsch Initial Type Bending Roll
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BRAKES—LEAF TYPE
12' x ⅜" Dreis & Krump
12' x ⅛" Dreis & Krump, Motor Driven

BRAKES—PRESS TYPE
12' x 5/16" Pacific Hydraulic, 300 ton

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#27 Williams & White, 22" Stroke, 16" x 80" Face of Crosshead.

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10 ton P&H	58' Span	230 Volt D.C.
10 ton Milwaukee	80' Span	230 Volt D.C.
With 5 ton Auxiliary		
10 ton P&H	96' Span	220 Volt D.C.
15 ton P&H	58' Span	230 Volt D.C.
20 ton P&H	60' Span	230 Volt D.C.
20 ton Toledo	75' Span	550/3/60 A.C.
30 ton Alliance	50' Span	230 Volt D.C.
With 10 ton Auxiliary		
120 ton Whiting	80' Span	220/3/60 AC.
With 10 ton Auxiliary		

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2.7 ton Heroult Top Charge
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35' x 1½" Southwark, 16 Pneumatic Jacks

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150 ton HPM Double Acting, 36" Max. Ram Travel Bolster 36" x 36"
300 ton United Steam Hydr. Forging Press
530 ton Baldwin Southwark 12" Stroke 48" x 25" Between Columns
800 ton Clearing 48" Stroke, Bed Area 48" x 48"
1000 ton Lake Erie Double Acting 46" Stroke, Bed Area 72" x 146"
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2045 ton Birdsboro, 4 Columns, 14" Stroke Platen 42" x 40" Daylite 47"
4500 ton B-L-H Hydr. Forging Press

PRESS—Straight Side
Clearing Model TF41500-200 Triple Acting, Strokes 40, 32, 14". Bed Area 100" x 200"
Verson 81-40 Mech. Eccentric Type Single Point Suspension Press. 200 ton, 30" Stroke

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#1½ Buffalo Universal Ironworker
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12" x 16" Phila. Single Stand Two High
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8 Stand Rafter Tube Forming Machine, Spindle 1⅞"
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80" x ¾" Pels

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1	500	Cr. Wh.	720	600	2300/440
2	500	Whse.	1200	125/250	2300/440
1	400	Cr. Wh.	1200	125/250	2300/440
1	300	G.E.	1200	250	2300
1	200	G.E.	1200	250	2300
1	150	G.E.	1200	250	2300
1	100	Whse.	900	250	2300

LARGE MILL MOTORS

Qu.	H.P.	Make	R.P.M.	Volts	Type
2	3000	Whse.	600	525	tandem
6	1500	Whse.	600	525	Encl.
1	1250	G.E.	850/790	600	MCF-6
4	800	Whse.	600	525	Encl.
4	700	Whse.	600/700	250	Encl.
2	600	Al. Ch.	257/600	600	Mill
1	250	Al. Ch.	250/1000	250/375	Mill

SLIP RING MOTORS
Constant Duty, 3 Phase, 60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	G.E.	MT-498	2300	360
2	1000	G.E.	M-575-S	2300	1185
1	750	G.E.	I-M	2200	400
1	500	Al. Ch.	ANY	2200	505
1	500	G.E.	I-M	2300	450
1	450	G.E.	I-14-M	2300	505
1	450	Whse.	CW	2200	440
1	400	Al. Ch.	ANY	2200	505
1	400	G.E.	MT-434	2300/440	352
1	300	Whse.	CW-1012	2200	704
1	250	Al. Ch.	ANY	440	705
1	250	Whse.	CW-1104	2200	435
1	250	G.E.	MT-414	2200	300
2	200	Al. Ch.	ANY	2200	585
1	200	G.E.	I-14-M	2200	490
1	150	Al. Ch.	ANY	440/220	705
1	150	Whse.	CW	440/220	490
1	150	Whse.	CW-1000	440/220	435
1	100	Whse.	CW	440/220	870
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1	2200	G.E.	MCF	600	400/500
2	1500	Whse.	Rev.	600	600
1	1000	G.E.	MCF	600	350/700
1	940	Whse.	QM	250	140/170
1	800	Whse.		250	450/550
1	600	Al. Ch.		250	400/800
1	500	Whse.	CC-216	600	300/900
3	450	Whse.		550	415
1	350	Whse.		250	325/650
1	250	G.E.	MPC	230	400/600
1	200	G.E.	CD-1650Z	230	500/1500
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	1150
3	150	Cr. Wh.	83H-TEFC	230	890
1	150	Whse.	SK-151B	230	900/1800
1	150	Whse.	SK-201	230	360/950
1	120	G.E.	MCF	230	250/1000
1	125	Whse.	SK-183	230	850
1	100	Rel.	1050P	230	400/1200
2	100	Whse.	SK-181	230	450/1000
2	100	Whse.	SK-181	230	450/1000
2	75	C.W.	53H-TEFC	230	860
1	50	G.E.	MD-412AE	230	550

M-G Sets—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
2	2000/2400	G.E.	450	250/300	2300/4600
1	1750/2100	G.E.	514	250/300	2300/4600
1	2000	G.E.	500 25cy	660	11000
1	2000	G.E.	514	600	6600/13200
1	1500	G.E.	720	600	6600/13200
1	750	Whse.	900	250	2300/4000
1	600	G.E.	720	250	440/2300
1	500	Whse.	900	125/250	440
1	300	Whse.	1200	250	208/440/550
1	200	Whse.	1200	250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
1	2500	A.C.	OA 3	6900/11900x2400/4160Y	
3	1000	G.E.	HVDDJ	1	2400x480
6	1000	Wagner	OISC	1	13200x460
3	667	G.E.	HD	1	13800x2300
3	333	G.E.	HS	1	7200x2400/4160Y
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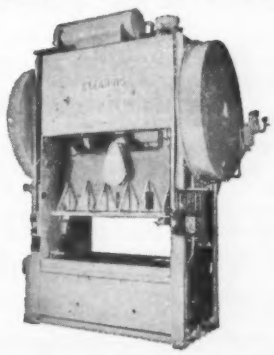

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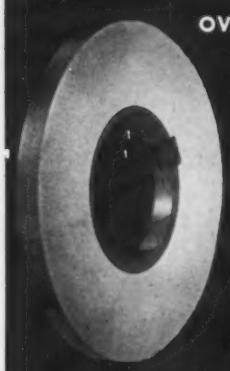

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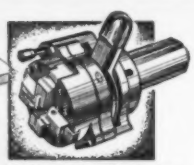

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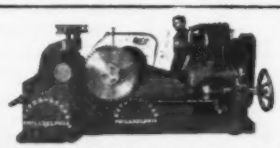

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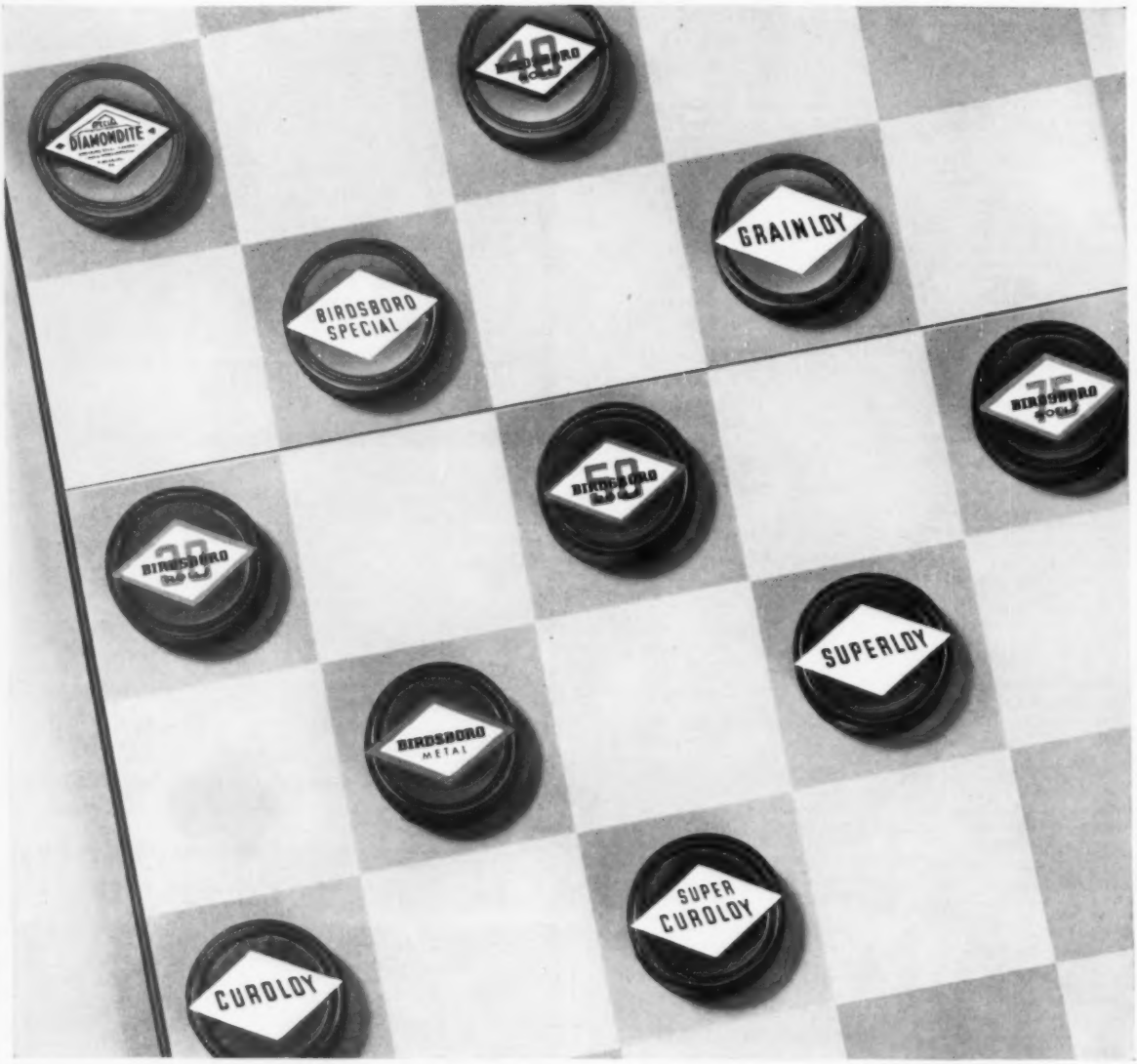

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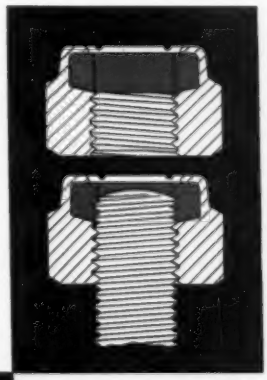

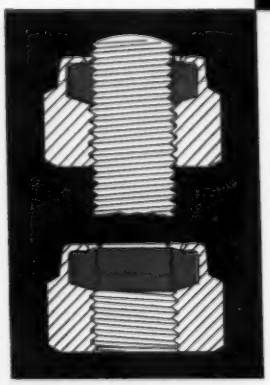

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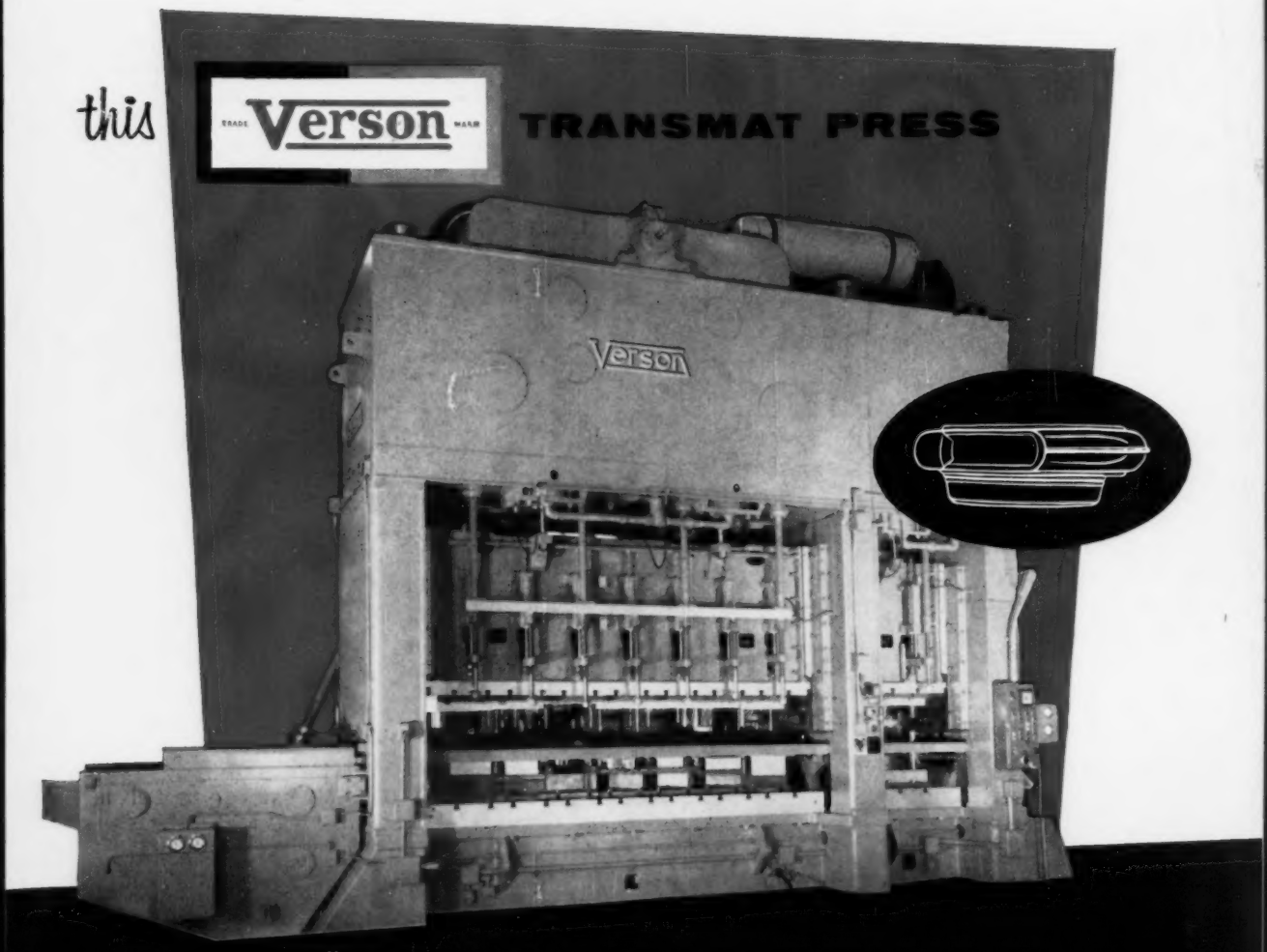

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